# SKYWAYS

MILITARY ★ CIVIL ★ COMMERCIAL AVIATION

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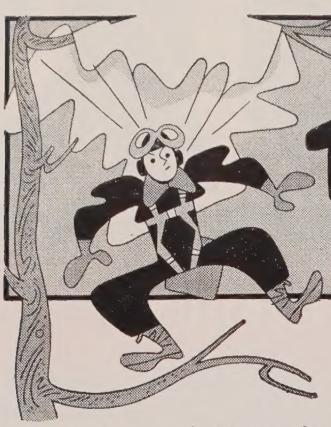
rthur Godfrey's
xecutive DC-3
page 10

*Pilot Report:* USAF T-28
page 14

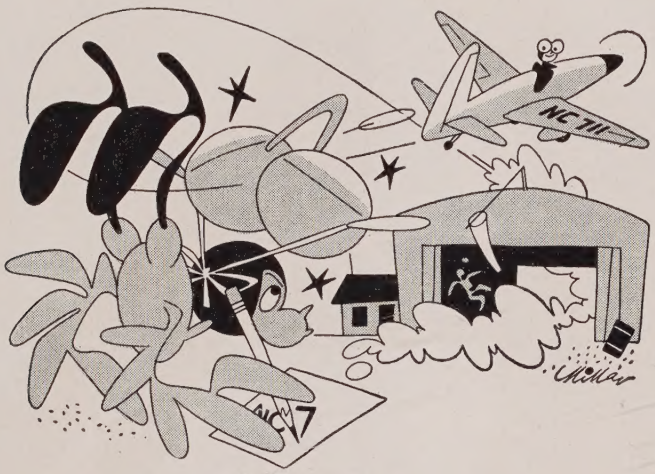
DEC. 1950 25¢



# The Birdmen's Perch

**OKAY**—so we're boilin' mad!

Just read some CAB figures on "buzzing" accidents and they're just too sickening to repeat. All of which makes us




wonder why that super-idiotic category known as "buzz-boys" don't become *Kamikaze* pilots. They'd stand a better chance.

"Buzzing," taking chances at low altitudes, is by all odds the stupidest, most dangerous thing a pilot can do. You not only risk your own life, but the lives of others, your plane, and damage to other property!

In short, the so-called "buzz-boy" is a menace—arch enemy No. 1—to the perpetuation and advancement of aviation and all that it stands for.

As a flyer or aviation enthusiast, you've got a duty to perform. Report "buzzing" airplanes immediately. If necessary, testify in court to make the charges stick!

Get those "buzzers" out of aviation and out of your hair!

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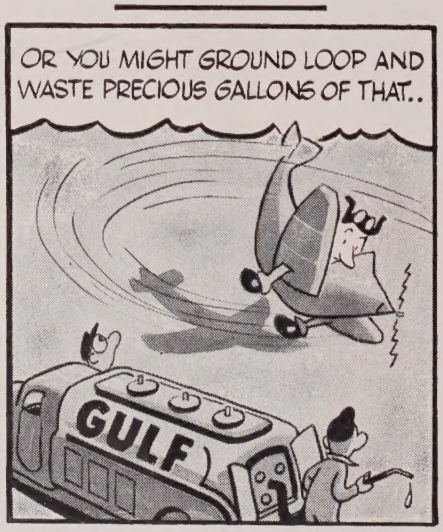


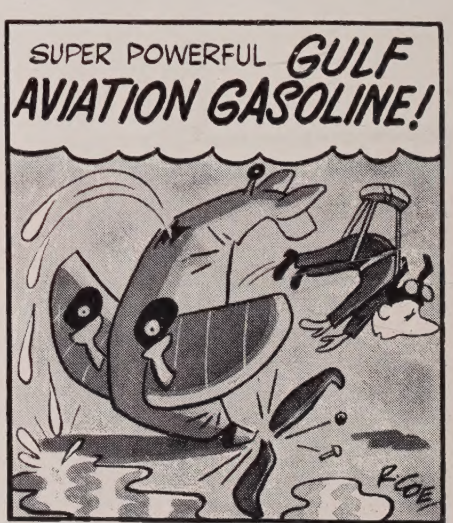


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# SKYWAYS

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## ..The Navy's P2V

Like other Lockheed aircraft, the Navy's powerful P2V Patrol Bomber, the Neptune, is today far more versatile than its original prototype. The physical changes that this plane has undergone are so advanced they are secret, but the proved achievement of the P2V series is a matter of record.

The P2V holds the world's longest *non-refueling, non-stop* flight record of 11,236 miles—from Perth, Australia, to Columbus, Ohio.

It is the largest airplane to take off from an aircraft carrier.

A squadron of Navy P2V's flew 691 hours photographing the Arctic in an unprecedented aerial survey. They took more than 120,000 separate pictures.

P2V's in the Arctic have operated successfully in extremely adverse cold weather, as cold as −42°F.

Neptunes are currently engaged in vital operations in the Pacific area.

Long in quantity production, the Neptune provides the Navy with a patrol bomber designed for many jobs: anti-submarine warfare, all-weather reconnaissance, including hurricane patrol, long-range photo reconnaissance, air search and rescue, special carrier-launched missions.

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# AIR YOUR VIEWS

### *Slow Roll It Again*

Gentlemen:

By all means let's have more of those articles such as "Slow Roll It," by Sammy Mason. I'm an ardent air-show fan and I've been considering the building of my own "special" for air-show work. How about a few articles on home-built ships as well as more articles on such personalities as Johnny Vasey?

H. J. DIRGO

No Address

*Will do, Sir. Have several articles shaping up by well-known air-show pilots, and we'll schedule them as soon as they reach this office.*—ED.

### *F-84F or . . .*

Gentlemen:

The Republic Aviation Corporation's YF-96A is no longer in existence. It's the F-84F.

D. B. VICTOR

Beverley Hills, Calif.

*Right you are, Mr. Victor. Notice of the change in designation reached this office a few days after our mention of the YF-69A went into foundry. 'Twas too late then to change it. They're the same airplane, though, just a change in designation.*—ED.

### *Piper Skysedan*

Gentlemen:

What happened to the Piper *Skysedan?* Is Piper still making it?

C. PFEIFFER

Kirley, S. Dak.

*No. Word is that the* Skysedan *never got out of the experimental category. Pilots who flew it, however, reported it was one of the best airplanes ever built . . . and we share their regrets that Piper never did put the all-metal* Skysedan *on the market.*—ED.

### *Old-Timer*

Gentlemen:

Looking through your recent issue of SKYWAYS I noticed quite a few pictures of old-type aircraft now seldom seen. Maybe you'd be interested in the plane I've done a lot of flying in? Here's a picture (*see photo below*) of it. That's the owner on the right, and I'm on the left.

The plane is an old 1932 Bird with 165-hp Kinner engines. The plane has very good performance, nearly equalling that of the Stearman PT-17. At sea level it will take off short of 500 feet, thanks to the high camber of the top wing.

The first owner of this plane was Wiley Post, and he logged many flights in it. However, the plane has not always been in these southwestern states where it is now operating and where it operated in the '30's. The present owner, Mr. H. D. Olson, found the plane for sale at a small airport in Washington. He bought it, fixed it up and put it back flying. After a year of flying the Bird in the northwest, Mr. Olson and I flew it to Lubbock, Texas, in 15 hours (from Pasco, Washington). The Bird cruises at 95 mph; uses 9 gallons of fuel per hour out of a 42-gallon tank; and it's a four-placer. It's a good airplane.

J. B. KAYS

Lubbock, Texas

*Thanks for the photo, Mr. Kays. We remember the Bird very well. Your editor got his pilot's license in a "cuzzin" of that biplane . . . a Fleet with a 165 Kinner in the nose.*—ED.

### *A or B26*

Gentlemen:

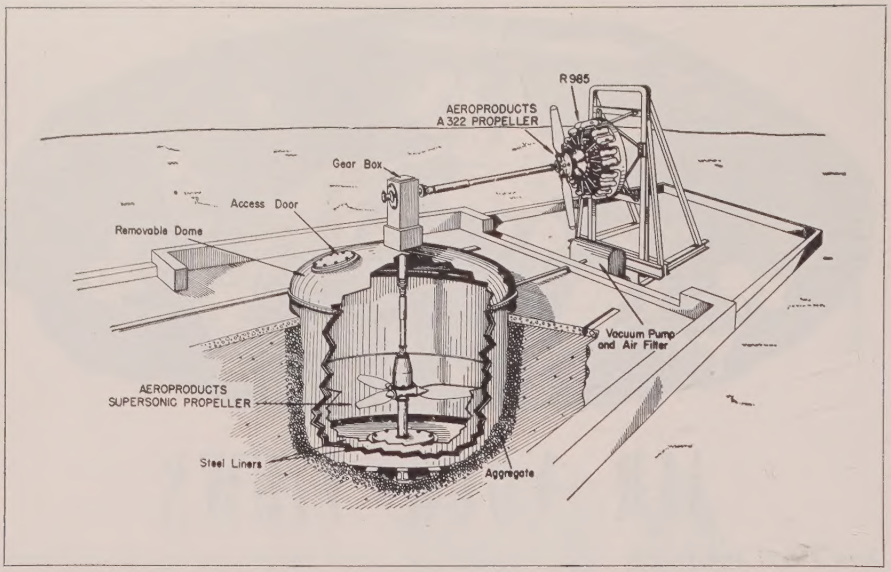
I seem to have a little trouble . . . and it's between two planes—the Douglas A-26 and the Martin B-26. Did the A-26 replace the B-26, and could you give me specifications of each? I thought the A-26 and the North American F-51 were made obsolete after the war. Are they still considered obsolete?

A. OKONIEWSKI

Wilmington, Dela.

*Some months ago, the Air Force designations of aircraft were changed: fighters became "F" instead of the old "P", etc. When this designation change took place, the Douglas A-26 became the Douglas B-26 . . . the Martin B-26 is no longer a part of the Air Force stable of military aircraft. Hereinafter when you read about a B-26, it is the old A-26 by Douglas. The Korean conflict forced a revision of thinking on the part of some higher ups in the picture of strategical vs tactical operations . . . and the net result is that the tactical F-51 and the B-26 suddenly found themselves needed . . . but badly. While both are "obsolete," both proved useful and not obsolete for a particular tactical job. And there's many a soldier who saw action in Korea who'll tell you both planes were by no means obsolete.*—ED.

**BIRD BIPLANE,** 1932 vintage and powered by 165-hp Kinner, is still flying down Texas way




**PROP SPIN PIT** is expected to be put into operation soon by Aeroproducts Division of GM

# MILITARY AVIATION

### *ZPN Airship*

Construction of the new ZPN anti-sub airship is underway at Goodyear Aircraft's factories at Akron, Ohio. Identified as an "N"-type airship, the bag of the new Navy blimp has a capacity of 875,000 cubic feet of helium gas. The control car has two decks, and includes crews' quarters, galley, dining quarters on the upper deck and operational stations on the lower deck. Powerplants are two seven-cylinder single-row engines driving Curtiss Electric props. Speed of the new airship is expected to be 75 knots (approximately 86 mph).

### *Thurlow Award*

The Thomas L. Thurlow Award of the Institute of Navigation recently was presented to Cmdr. Thomas D. Davies, USN. Pilot of the "Truculent Turtle," the Navy P2V plane which established in 1946 the world nonstop flight record that still stands, Cmdr. Davies was given the award "for his original conception of the Pfund Sky Compass and assistance on the research work of this item for over a period of years." Currently attached to NAS, Seattle, Cmdr. Davies holds the DFC for action resulting in the sinking of the German submarine U-604 in 1943. Sherman Fairchild presented the award.

### *Air Strength Up*

The Joint Chiefs of Staff have asked President Truman for an increase in Air Force and Navy plane procurement for fiscal 1951. Hopes are for a 90 to 100 group Air Force instead of the Johnson-designed 69 group presently planned for. Navy asks for boosts to equip and operate 12 large and 15 small aircraft carriers, as compared to the present seven and eight carriers now operated.

### *CAP For Defense*

Civil Defense Directors of all the 48 states, Alaska, Hawaii, District of Columbia and Puerto Rico have received offers from the Civil Air Patrol to act as an air arm in the state Civil Defense organizations. The CAP today is an organization of 150,000 volunteer civilians pledged to the nation's defense and advancement of aviation. It is an official auxiliary of the USAF.

### *B-17 Tests Turbo-Wasp*

At the Navy Test Center, Patuxent, Maryland, a B-17 is being used to test the new Pratt and Whitney T-34 *Turbo-Wasp* jet engine. Mounted in the nose of the B-17 (*see photo*), the *Turbo-Wasp* pulls the bomber along at normal flying speed with the plane's regular engines turned off. The rating of the T-34 (6,000 hp) is greater than the combined power of the 17's four 1200-hp engines. This new Pratt and Whitney engine has a lower fuel consumption than other jet engines and, therefore, is expected to enable military planes to attain 600-mph speeds and still have greater range than other jets.

### *Industry Notes*

HUDSON PHILLIPS has been named director of public relations for Convair.

TEXAS ENGINEERING & MANUFACTURING CO., INC. of Dallas, Texas, has been awarded a subcontract to manufacture major assemblies for an advanced version of the Lockheed patrol bomber.

GENERAL ELECTRIC COMPANY recently purchased the patents, name and technical data of the Turbodyne Corp., of Hawthorne, California, a Northrop research subsidiary.

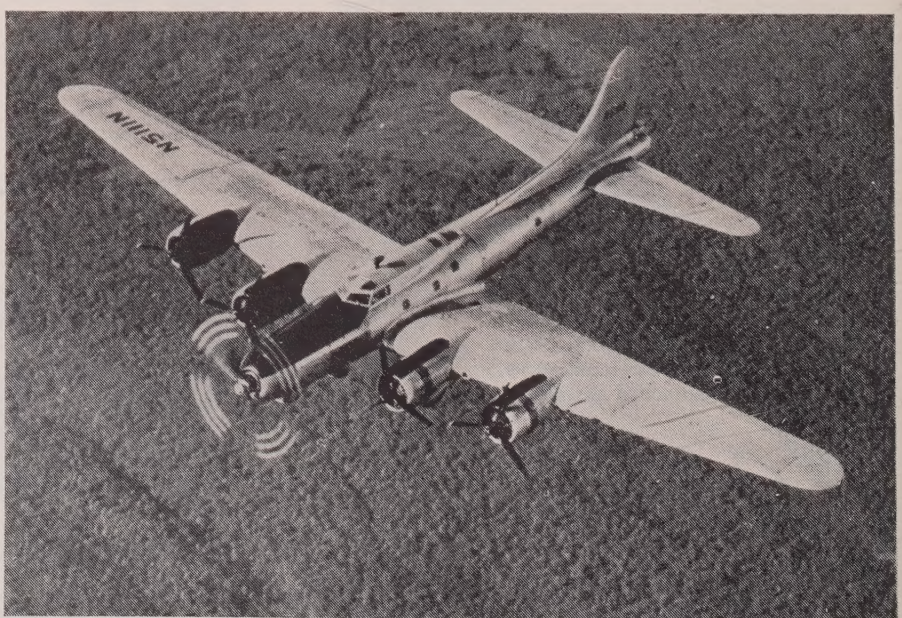
BELL AIRCRAFT has received a large production order for helicopters for the Army Field Forces. Army designation for the 'copter is H-13D.

AEROPRODUCTS DIVISION of General Motors Corp. plans to begin operation of the first supersonic propeller "spin pit" sometime early in 1951. Developed under contract with the Navy, the pit is designed to carry out tests on very high-speed props.

NORTH AMERICAN AVIATION is taking over the operation of a government-owned aircraft factory in Columbus, Ohio, under an agreement with the U.S. Navy. This plant has been operated by Curtiss-Wright Corp. since early in World War II.

NORTHROP AIRCRAFT has begun construction of a noise-suppression muffler at its factory at Hawthorne, Calif. The muffler, as big as a five-room house, is to be used in pre-flight engine testing of USAF's F-89.

PRATT & WHITNEY AIRCRAFT is putting its Southington, Conn., plant back into operation. The plant will manufacture engine parts to feed assembly operations at Pratt & Whitney's East Hartford plant.




**PRATT & WHITNEY T-34,** called "most powerful jet engine," is tested in nose of Boeing B-17

### TV for Plane Tests

At Wright-Patterson AFB, two war surplus F-24's (formerly Douglas A-24's) are being flight tested via a new system which enables engineers to get performance data never before obtainable, and with no human life at stake. Video cameras ride the hazardous flight tests while the test pilot operates the aircraft by means of remote controls on the ground. Radio waves from the ground control the dives and loops of the plane being tested, while video cameras focus on the instrument panel, recording the data on screens set up in the ground control station. Thus far, the tests have indicated that the use of TV to replace test pilots is practical.

### Curtiss-Wright and Armstrong Siddeley

The British Armstrong Siddeley *Sapphire*, called "world's most powerful jet engine," has been bought by America and will be built by Curtiss-Wright Aircraft Corporation. A long-term contract between the two companies provides for a complete exchange of research and technical information and covers a license to build the *Sapphire*, the *Pyton*, *Double Mamba* and *Mamba*.

### Russian Warplanes

Russia is stepping up production of its 600-mph Yak-17 jet fighters to between 9,000 and 10,000 a year, in addition to many long-range bombers. This compares to the 2,713 military planes of all types scheduled for production in the U.S. prior to the war in Korea. Since that time, however, U.S. production has been stepped up to some $7.5 billion worth of new airplanes.

### Navy Orders Hillers

Navy BuAer has announced the awarding of a contract for the purchase of an initial quantity of Hiller 360 helicopters. The new Navy Hiller 360's are to be basic training 'copters and will be modified versions of the standard Hiller production model with specific Navy appointments. The Navy Hiller will carry three passengers at a gross weight of approximately 2,400 pounds.

**HILLER** 360 has been ordered by Navy Bureau of Aeronautics as a basic trainer

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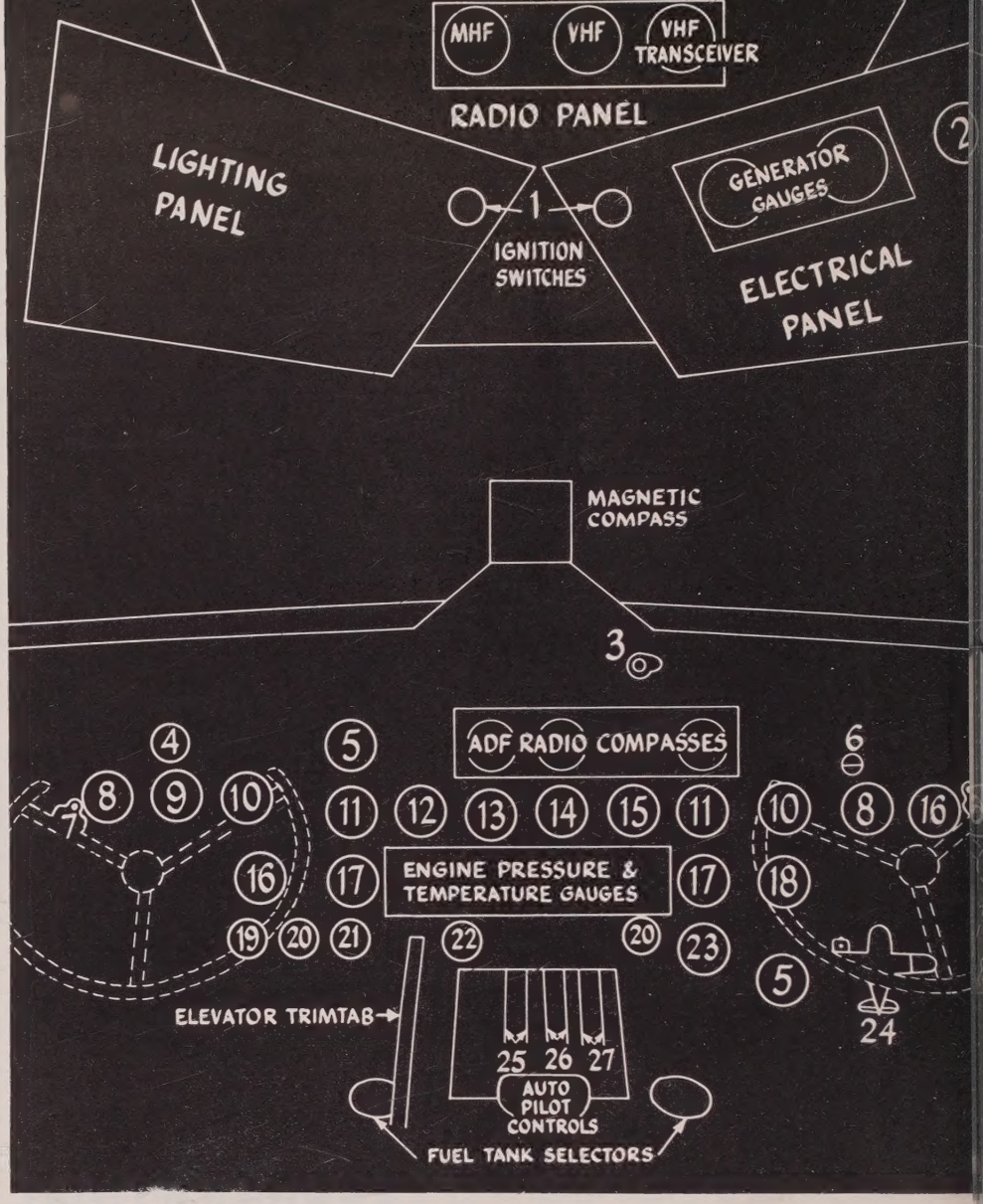
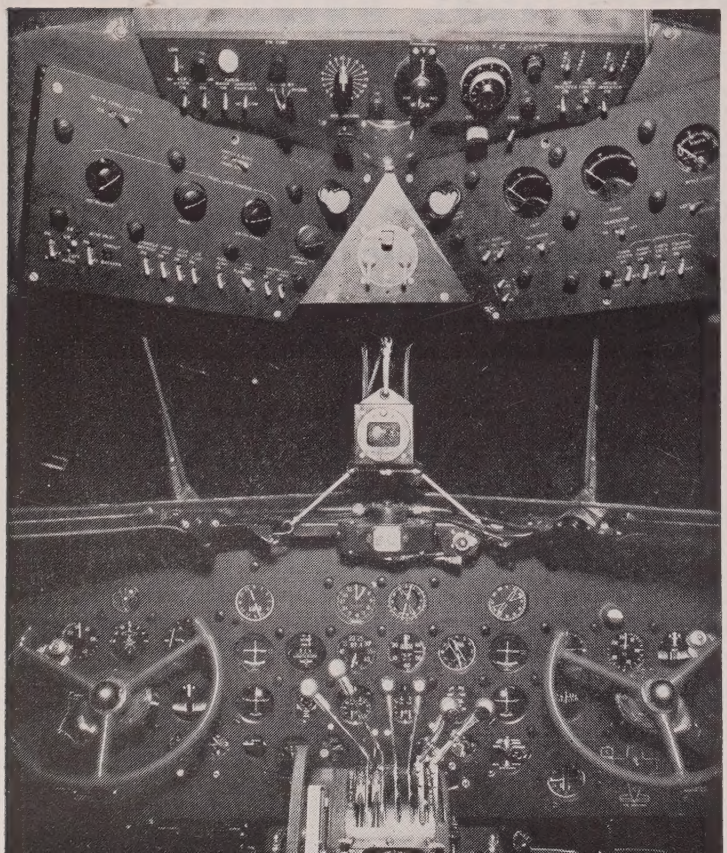


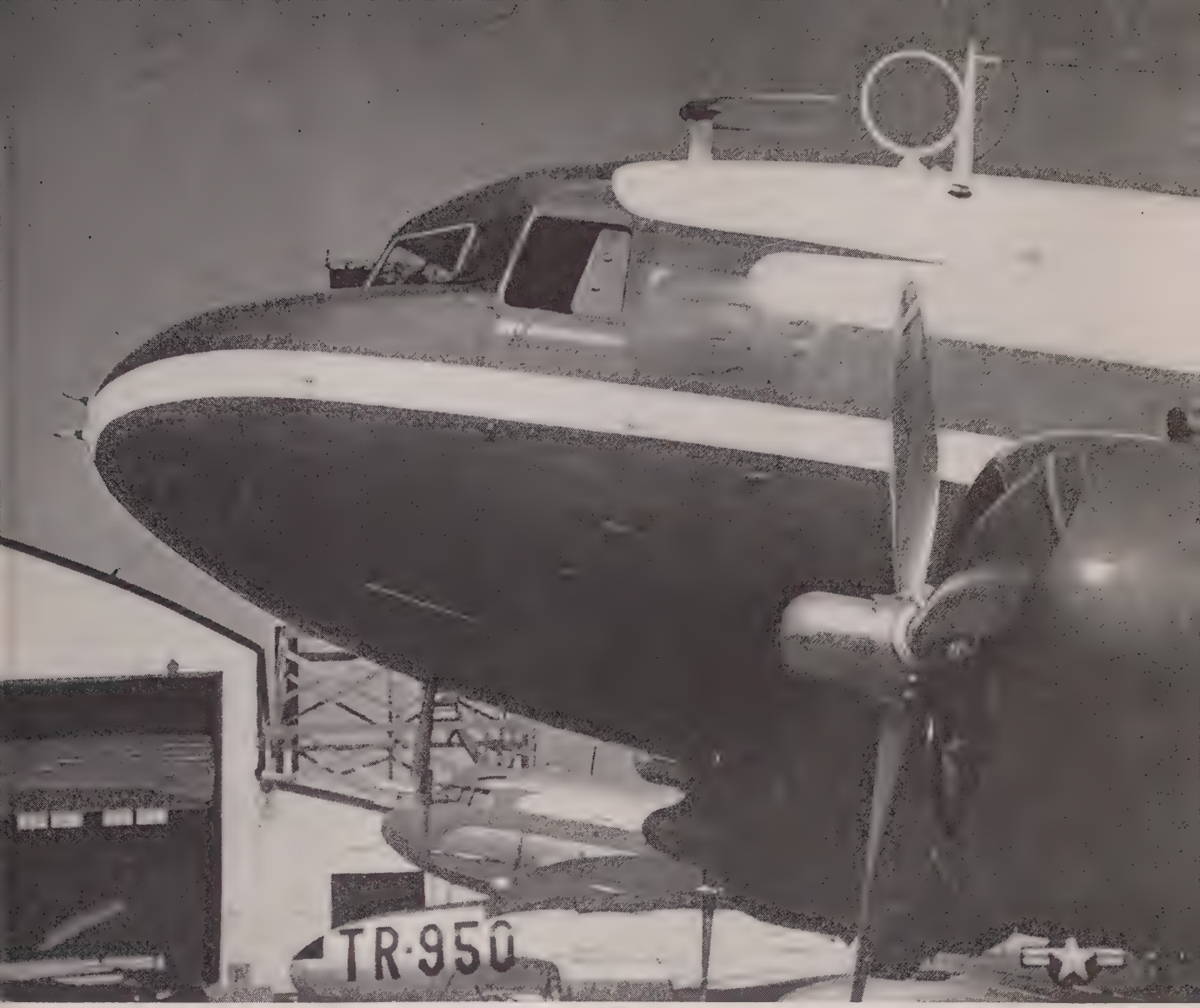

**COCKPIT** layout in Godfrey's airplane is set up this way: Top panel, center, contains all radio switches; left panel contains light switches; Center small panel holds ignition switches; right panel contains generator gages, is electrical panel. Magnetic compass is below ignition. 1. Prop Feather buttons; 2. Pitot heat indicator; 3. Windshield wiper control; 4. Marker Beacon lights; 5. Gyrosen compass; 6. Instrument inverter failure warning indicator; 7. Autopilot quick-release button; 8. Airspeed indicator; 9. Fluxgate compass; 10. Artificial horizon; 11. ILS indicator; 12. Omnirange course selector; 13. Tachometer; 14. Manifold pressure gage; 15. Zero Reader Heading selector; 16. Turn-and-Bank; 17. Zero Reader; 18. Directional Gyro; 19. Instrument vacuum; 20. Clock; 21. Wing de-icer; 22. Cabin heat indicator; 23. Zero Reader selector switch; 24. Aircraft diagram with fire warning lights; 25. Prop controls; 26. Throttles; 27. Carb. heat

**GODFREY DC-3,** converted by Remmert-Werner of St. Louis, is one of the best equipped executive planes flying today. Equipment includes Collins omnirange, Lear autopilot and the Sperry Zero Reader. Estimated value of the plane is said to be in vicinity of $125,000. Note panel *(below)*



# GODFREY'S EXECUTIVE TRANSPORT

***An airline pilot flies Arthur Godfrey's new executive DC-3, and reports it best-equipped in skyways***




**EXECUTIVE** transport is painted blue and white, with flag on vertical stabilizer. Note "Capt. Arthur Godfrey" under window

## By D. N. FAIRBAIRN

Arthur Godfrey no longer has to fly the iron compass. The man who told the Corporation Aircraft Owners Association 1950 Forum that he always has a railroad track underneath him now has one built into his newly acquired DC-3.

Converted by Remmert-Werner of St. Louis, the N1M is one of the best equipped DC-3 airliners that I know of. In fact, it's said to be valued at some $125,000—no small sum for a DC-3. In addition to the conventional navigation equipment such as ADF's, an MHF range receiver and marker beacon and ILS receivers, the airplane is fitted with the Collins omnirange equipment, 51R Omni Receiver, 17L Transmitter, 51V Glidescope and 18S1 Marine telephone, the Pioneer fluxgate compass, the Lear lightweight autopilot, including Localizer and Approach Control, the Sperry Zero Reader and a host of other cozy gadgets. That ship can do everything but bark and wag its tail. Let's break it all down and you'll see what I mean by a built-in railroad track.

First of all the ADF's. Nothing remarkable about those, of course. They've been in use for years. Just tune in any medium frequency range station or beacon and the needle points right to it. You read your relative bearing off the dial. But Godfrey's ADF's have a new wrinkle called RMI. The dial operates like a magnetic compass. No mental gymnastics of relative bearing + magnetic heading = mag bearing. You read your magnetic course to the station at a glance, right where the needle points. When you have two of these receivers like Godfrey has, you practically have a running fix.

The ADF set-up doesn't stop there. There is also a VHF ADF, so he can get radio-compass indications from the new VHF ranges and beacons. This is real brocade and velvet (*Continued on next page*)

**POWERPLANTS** in the Godfrey airliner are Wright 1200-hp engines. Frank La Vigna is co-pilot; Pete Kinney is mech

when it comes to pesky heavy static conditions.

Much of the other equipment was new to me, so I went down to Teterboro to see if I couldn't persuade Frank La Vigna, Godfrey's co-pilot, to give me a demonstration. Frank has been flying commercially for 13 years and has 6500 hours certified flying time. He told me that Arthur Godfrey had close to 5,000 hours himself, so you can see that the airplane is as well equipped in the cockpit as it is on the instrument panel.

Pete Kinney is the mechanic. He's been working on airplanes for 18 years and holds a Flight Engineer's rating as well as an A & E and a CAA Maintenance Inspector's ticket. He spent 11 years with Curtiss-Wright so you know those Wright G202A 1200-hp engines are pulling their share of the load. The engines' spark plugs are Champions.

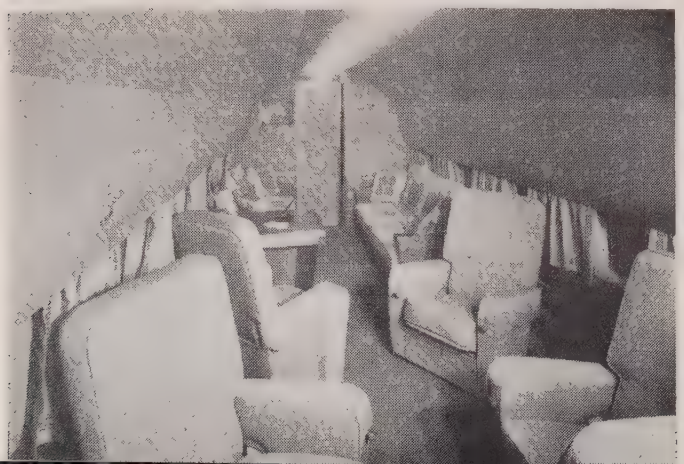
I had a chance to look the ship over while Frank made a quick pre-flight inspection. Among the conventional DC-3 items that have been retained on the N1M are the Goodrich wing de-icing boots and Goodrich Expander Tube brakes on the Bendix wheels. The aircraft is equipped with Hamilton-Standard hydromatic propellers. These are the full-feathering type so that if one of the engines should fail, the prop can be faired into the airflow. None of those unpleasant back massages that a dead prop can give you when it's windmilling in the breeze.

The paint job is a trim-looking blue and white: blue for the wings, belly and tail assembly; white for the top of the fuselage with a white stripe under the windows. There is an American flag painted on the vertical stabilizer after the fashion of our international airliners, presumably in case the ship should make foreign trips.

The interior is furnished like first class on the Queen Mary. Soft greens and browns are the colors with the cabin itself upholstered in leather and gabardine. A Bigelow carpet covers the floor. The furnishings include two three-place divans, four full-swivel reclining chairs, four stationary chairs, and inlaid map table, walnut desk, Motorola radio and, believe it or not, a 16-inch Capehart television receiver. The TV set gives excellent results with no ignition interference at all from the two 1200-hp Wright engines. The plane is completely sound-proofed with Owens-Corning Fiberglass.

Aft of the cabin door is a semi-circular observation lounge, much like those in the Douglas DC-6 airliners. It is flanked by two oversized windows which are as close to being picture windows as is practical in an airplane. (*Continued on page 41*)

**PLUSH INTERIOR** includes Capehart television, inlaid map table, walnut desk, two three-place divans, swivel chairs



**OBSERVATION LOUNGE** is semi-circular and built in aft of DC cabin door. It is flanked by two over-sized windows

# Flying Omnirange

**OMNIRANGE ANTENNA,** without its protective "derby" shield, looks like this. More than 300 already are in operation

An entirely new kind of radio range for air navigation, known as the omnirange, is being installed by the CAA at more than 400 points in the United States to blanket the entire nation. More than 300 already are in operation. Eventually the omnirange will entirely replace the traditional four-course radio range.

The omnirange, which somewhat resembles a wide-brim derby hat, rests atop a 15-foot tower. Its performance as an air-navigation aid makes the old four-course range seem primitive.

The four-course range, standby of pilots for almost a generation, sends out "A" (.—) and "N" (—.) Morse Code signals which interlock along four courses or "legs." Along these courses, the pilot hears a steady tone instead of the "A" or "N" signal.

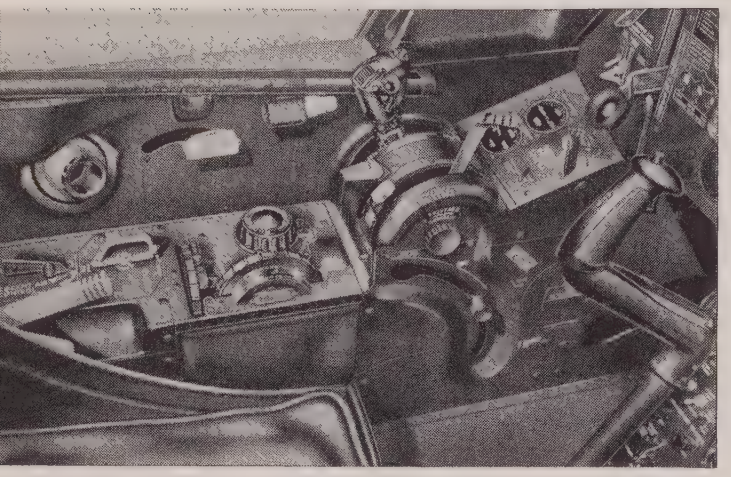
Back in the days when four-course ranges went into operation, comparatively few planes were flying. No one anticipated that four courses would not be sufficient for air traffic control. But today, in heavily congested areas, there is urgent need to use a number of additional courses. The omnirange makes it possible to use all the airspace by sending out courses in every direction, instead of only the four.

The limited number of courses, however, is but one drawback of the four-course range. Operating in low frequencies, it is subject to static, particularly when thunderstorms are in the vicinity and weather is severe—the very time it is needed most. Attempting to hear the range above violent bursts of static can make navigation physically trying for the pilot.

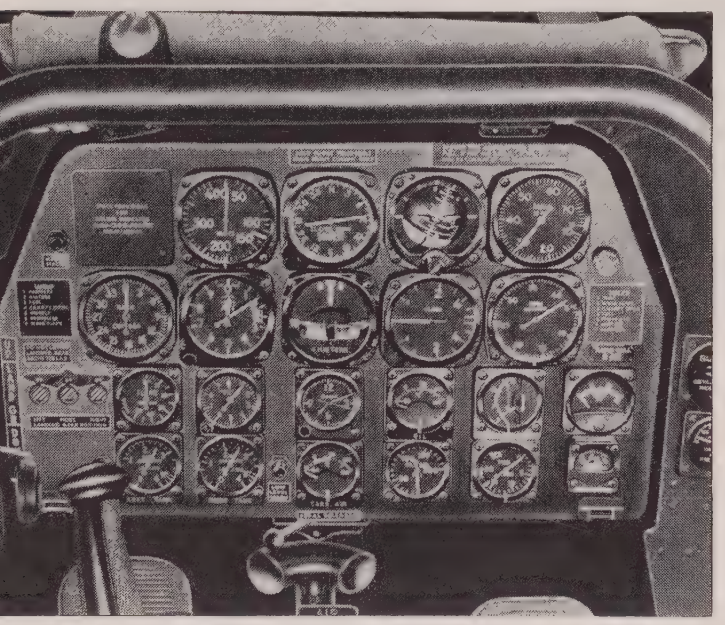
Because the four-course range has two "A" and two "N" quadrants, the possibilities for confusion between them can be serious to a lost pilot, who then must fly a complex orientation pattern to establish his position.

The omnirange eliminates these difficulties and provides additional (*Continued on page 37*)

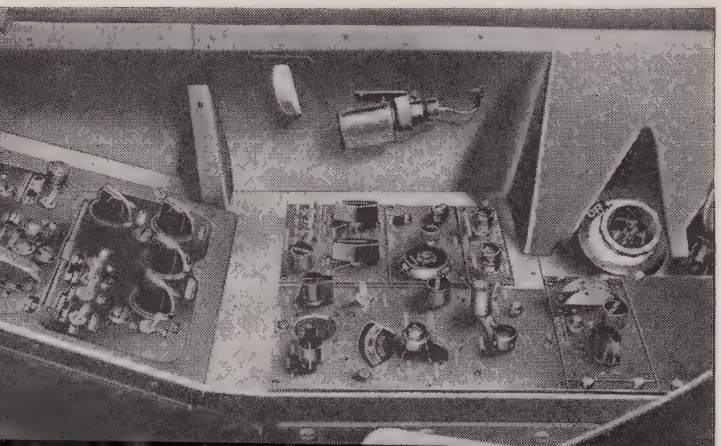
# *Pilot's Report*... USAF T-28



**FLAP CONTROL,** throttle, mixture and cockpit heater control are located on the left side of the T-28's cockpit



**INSTRUMENT PANEL** is well laid-out *(above)* for student flyer. Flight instruments are top two rows, engine instruments bottom two rows. Electrical system panel, radio and interphone are located *(below)* on the right side



***North American's new trainer gets AF cadets ready to handle the hot jobs***

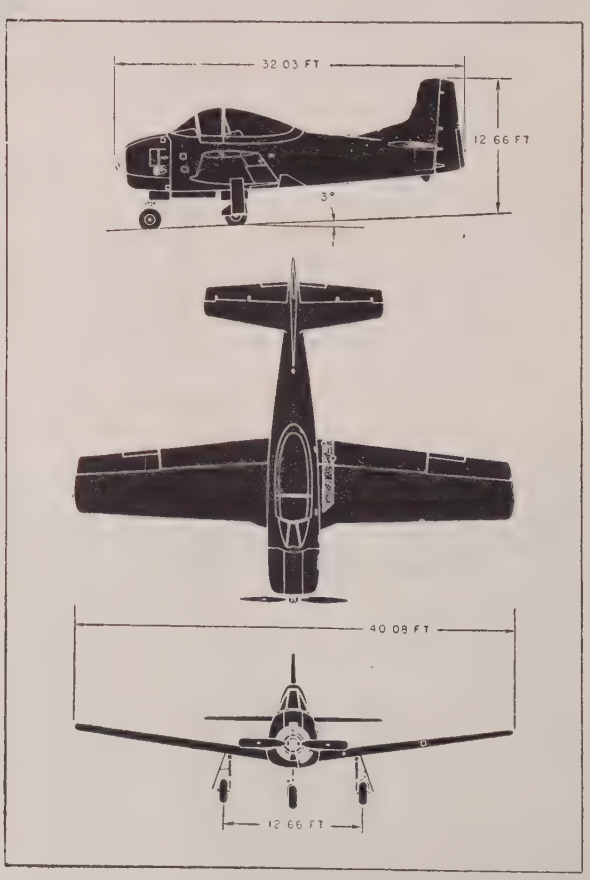
FLIGHT instructing is hard work—but the new T-28 will make it a lot easier.

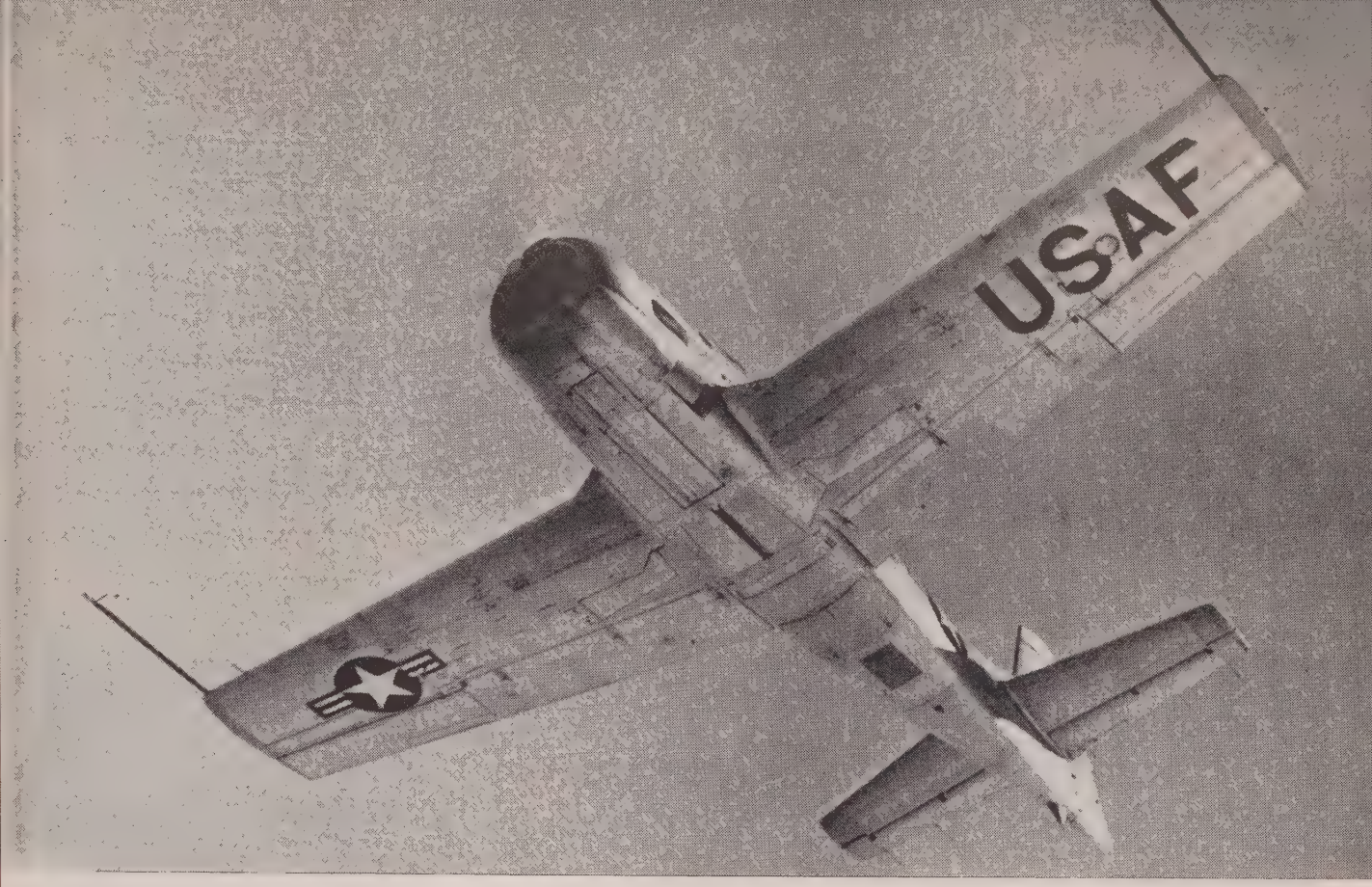
The long-suffering flight instructor is usually the guy behind the 8-ball. Too frequently he is buried behind narrow windows or hidden under the top wing of a biplane. No wonder he's hard to please!

There isn't an instructor in the business that won't love North American's new trainer. Even in the back cockpit—that hole in the rear that usually needs a periscope—visibility is completely satisfactory. The heavy turn-over structure presents no particular problems in vision and the clear bubble canopy has an uncanny lack of distortion. It's just like an open cockpit, but minus the wind.

This SKYWAYS pilot report was the first flight that any writer had made in the new trainer. Project

**THREE-VIEW** shows profile and dimensions of the Air Force trainer. Visibility for student and instructor is good






**AIR FORCE TRAINER** T-28 is powered by 800-hp Wright engine with Aeroproducts "butter-paddle" prop; cruises at 190 mph

## By DON DOWNIE

test pilot Jean "Skip" Ziegler was our check pilot for the hour and a half air junket. The trainer we flew carried the Air Force No. 529.

"This plane has had only one hop so far," explained Ziegler as we walked out to the old Pan Am hangar at the Los Angeles Municipal Airport. In addition to making the first flight with the T-28, "Skip" Ziegler has a record of test flying for Curtiss Wright and Bell Aircraft. He has logged over 1700 hours of test flying in the past eight years.

"This flight will be 'shake down' time on 529," said Ziegler.

It was! You can't talk about a training plane without talking about acrobatics. So we did acrobatics—and the T-28 proved it could take a lot more punishment than this writer. The T-28 is stressed for plus 7½ and minus 3 G's. Apparently, I'm not!

It's quite natural that the T-28 should look a little like the wartime AT-6 *Texan* since North American designed them both. However, the similarity is only slight since the new trainer has a tricycle landing gear, a clear bubble canopy, a big seven-cylinder 800-hp Wright engine and a 10-foot "butter-paddle" prop. It's tall, chunky and has square-tipped surfaces like the F-51.

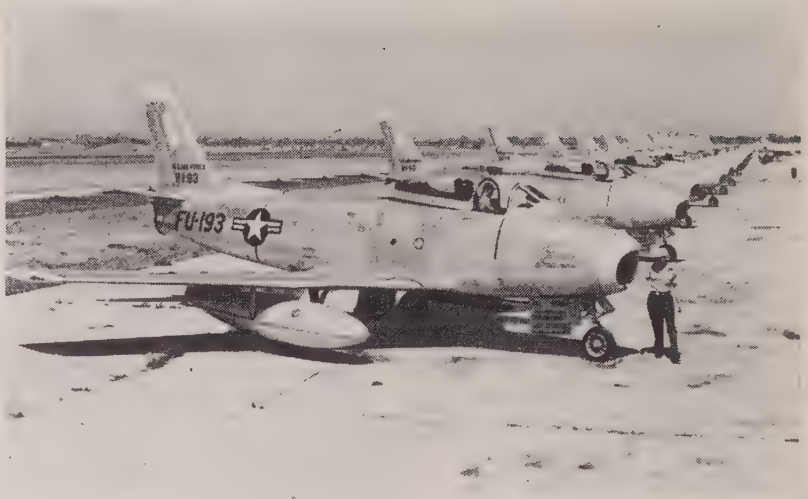
In a quick pre-flight inspection of the airplane, Ziegler pointed out the Aeroproducts constant-speed propeller with all its mechanism housed inside the prop hub except a single cable from the cockpit. The engine cowling, designed for easy maintenance, swings open in "orange-peel" style. It's designed for a complete engine change by two men in 45 minutes.

A man-sized hole in the fire wall can be opened by removing a single panel so that mechanics can adjust any accessories while the engine is running without opening the cowling and standing out in the prop wash.

Throughout this design, emphasis has been placed on mass production and ease of maintenance. For instance, outer wing panels may be removed without breaking the aileron cable system. Horizontal stabilizers are identical. Elevator and trim tabs can be interchanged by merely inverting the trim tab form fittings. And either horizontal or vertical stabilizers may be removed independently in 10 minutes.

You begin to realize how big this 6,759-pound trainer really is (that's heavier than the original P-40) when you climb up on the wing. There are two steps built into the left flap for a ladder to the wing. Then it takes one more step to climb up into the cockpit. Over-all height is 12½ feet. And when you're carrying a crash (*Continued on page 40*)

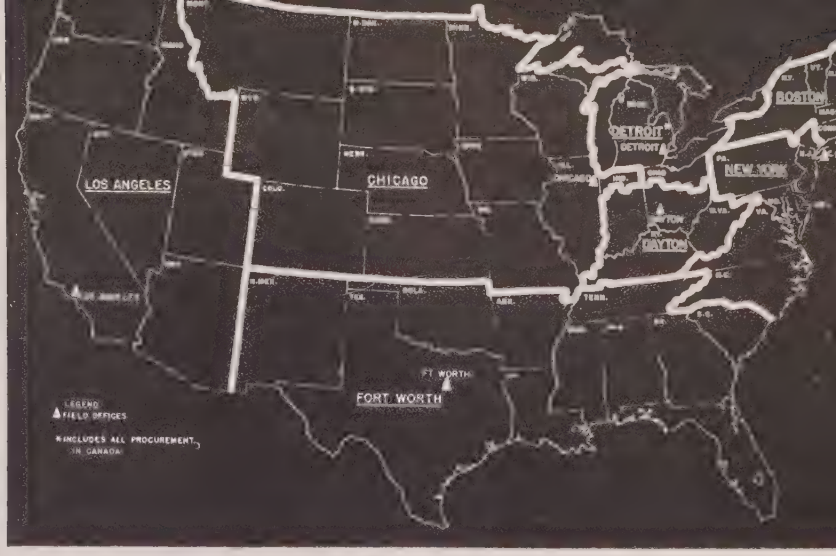
# Selling to the Air Force




**AIRCRAFT** production is up due to increased orders from Air Force, Navy

**NORTH AMERICAN** F-86 *Sabres*, just off production lines, are lined up at airport in California. These will be air-ferried to the AF

**MAJ. GEN. O. R. COOK** is Director of Procurement and Industrial Planning, WPAFB




**PLANT OWNERS,** operators wanting to do business with the Air Force should consult AF procurement field offices in their districts

# By COL. N. F. SILSBEE

The military aviation budget for fiscal 1951 includes $10 billion (that's 10 thousand million dollars) for the Air Force. More than $4 billion of this is for aircraft procurement. To provide for the projected 69-group Air Force, some $28 billion will have to be spent during the next four years. This makes the USAF American industry's biggest customer.

Thousands of companies are now making efforts to do something for the Air Force, partly to do their share for national defense and partly to stay in business.

The executives of many firms, particularly small business (*i.e.*, employing less than 500 people), who have never sold any of their products to the Air Force want to know how to go about it.

First of all a "don't." According to Lt. Col. R. A. Green, Chief of Procurement in the office of the Deputy Chief of Staff for Materiel (Maj. Gen. K. B. Wolfe) at Hq USAF, the best possible advice to give a would-be seller to the Air Force is, "*Don't* grab your brief case, get a room at the Hotel Statler in Washington and then dash for the Pentagon."

Another caution. Although practically everything the Air Force needs (over 580,000 different items) is purchased at the Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio, there are several things that can be done with advantage before taking a trip to Wright Field.

Prospective bidders for Air Force contracts can save both time and money by working through the Air Force Procurement Field Offices. If you have a machine shop in Connecticut, for example, you should contact Boston AFPFO, Boston Army Base, Boston 10. This office covers the New England states (except Fairfield County, Conn.) and all of New York State north and west (*Continued on page* 44)

**COLD WAR** and Korean conflict forced increase in aircraft orders from AF. Boost in plane-demand ups industry employment

# NEWS PHOTO BELOW

**PHOTOG-AUTHOR** Allen gets bird's-eye view of happenings. War surplus F-8 camera rests on knee when shooting

## By DEE ALLEN

*Photographer, Pasadena Star News*

"There's a forest fire booming west of Chatsworth. Deadline is an hour and 20 minutes," growled the City Editor over the phone. "Get your camera into a plane and pick up a good page-one shot."

So the news camera goes for another fly-ride.

More and more spot-news assignments are being photographed today from low-flying airplanes and helicopters. It's the quick-and-easy way of getting to that big story, making your pictures and high-tailing it back to the photo lab in time to make the day's edition.

Fires, floods, train wrecks and explosions all make page-one air photos. Whenever there's a big story that will fill the bill, someone on our paper always covers from the air.

"The bigger the news story, the easier it is to cover." That's an old axiom in the news photo business, and it holds true when shooting from the air as well as from the ground. The bigger the catastrophe, the easier it is to fly over and make your

**TANKER** burning at pier made newspaper's page one. Air coverage was only way to get full story in one picture

pictures—good story-telling illustrations—and get home ahead of the deadline.

Take the Azusa Aero-jet explosion a couple of years ago when a powder-mixing building for JATO units blew up late one afternoon. The company was working on a Navy project and, while there was no regulation in force covering military security at the time, you just couldn't get into the plant. So one of our photographers who is also a pilot rented an Aeronca trainer from the Monrovia Airport and picked up the only photos made that day of the catastrophe. By the time our competing papers got into the air, it was too dark to shoot. However, just to double-check, we had these air photos sent to the Pentagon Building by wire-photo for an official clearance. Then we printed them ourselves and sent them over a nationwide wire circuit.

Every year in the fall there are many local forest fires. They're tough to shoot from the ground because of the smoke, dirt and general inaccessability of the location. From the air our coverage is fast and clean with results that are frequently spectacular.

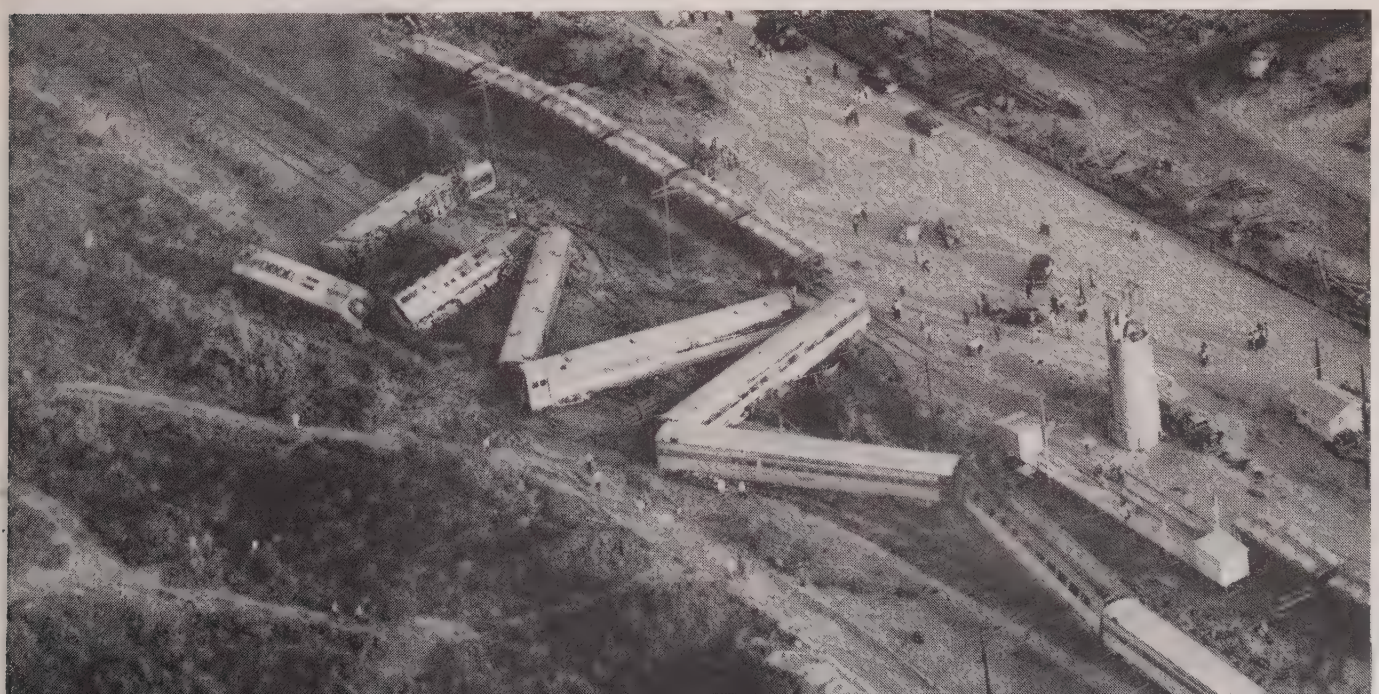
For this type of turbulent mountain flying, I prefer to pick a pilot who is familiar with the eccentric habits of air currents close to the hills. It's really rough above some of those infernos and pilots with sailplane experience seem to do the best job. On a set of pictures of a fire in Mint Canyon near Los Angeles before the war, I was shooting out of the front pit of an old F-2 Waco. It seemed that I saw more of the fire out beyond the wing struts than I did looking down. The ship pitched so badly that half of my negatives were blurred, but the others filled the bill. I came back off this trip with two knots on my head after bouncing my noggin off the bottom of the top wing. I was kneeling in the front pit with the safety belt snubbed over the back of my knees, but it didn't help much. I still bounced.

**ROSE BOWL** game is good subject for top-side coverage. Photo gives over-all picture of crowd attending

If you're really in a jam, you can shoot pictures out of any aircraft. However, the best plane for picture purposes in my book is the little yellow Piper *Cub*. You can fold down the side of the cockpit and have a front-balcony scene on any assignment in the world. Add the advantages of slow speed, a quiet engine that won't disturb residents on low-altitude flights, unsurpassed visibility without windows and a slow (*Continued on page 46*)

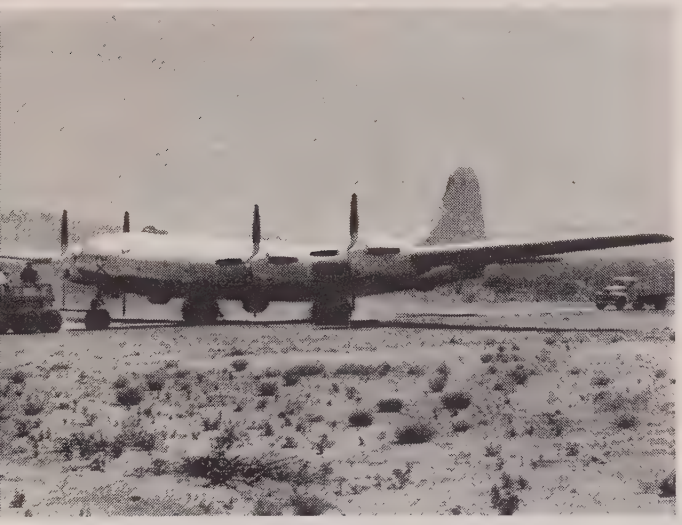


**PAGE-ONE** air photo shows wide-spread destruction of Santa Fe streamliner near Azusa. Single picture gives whole story

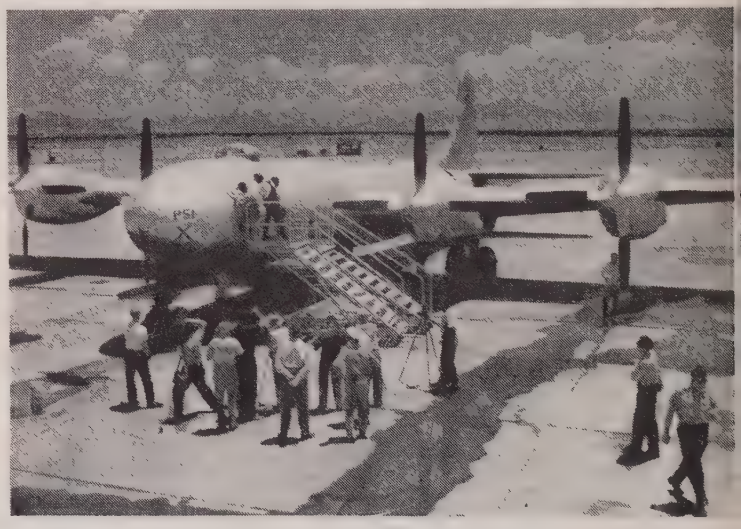


**COCOONED B-29** is towed out of the line of preserved *Superfortresses* at Davis-Monthan Air Force Base at Tucson, Arizona

**TOW-TRUCK** hauls cocooned "Superfort" down seven-and-a-half mile "highway" built in seven days by County Road Dept

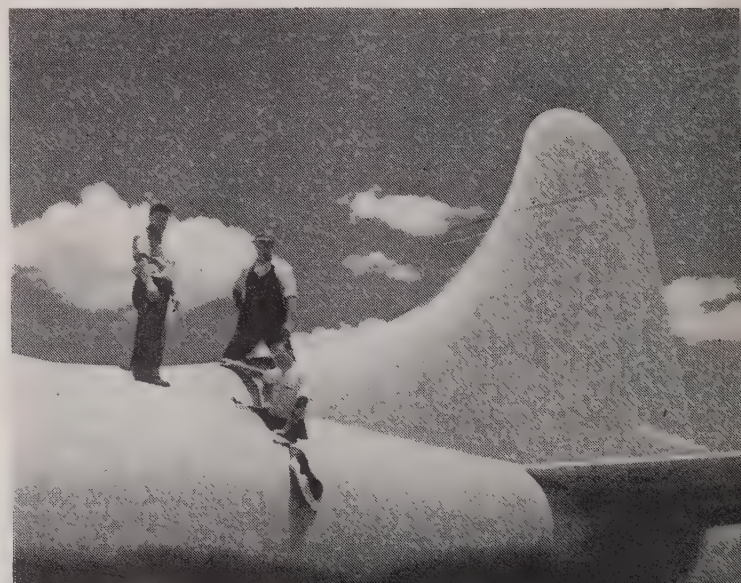


**FIRST STEP** in the reactivation was removal of many coats of plastic sprayed on plane in 1946. Cost: $1200 each



**WORKMAN** finds stripping of plastic a tough job, as Capt. H. L. Hensley of Davis-Monthan AFB watches cover come off

**TEMPERATURE** inside the "sealed" B-29 was almost unbearable until workmen broke open escape hatch near the tail



# Re-birth of a Bomber

**DE-COCOONED** and ready for an assault against any enemy, the World War II B-29 goes back into service as good as new

AFTER nearly five years of rest, Tucson's B-29's are coming out of "dead storage." De-cocooning these "Superforts" represents the conclusion of a mass preserving project begun by the Air Force early in 1946. Cost of preserving these $750,000 planes was $1,200 per plane. Five coats of special plastic were sprayed over each ship, with a different colored dye for each 10,000th-of-an-inch layer. The use of varying colors assured the workmen doing the job that each area was completely "sealed" and there were no leaks. A final coat of aluminum paint was sprayed over all areas exposed to the torrid desert sun. This was done to keep inside temperatures at a minimum.

**PLASTIC COATING,** five coats in all, plus a coat of aluminum paint, proved to be seven times stronger than rawhide

To re-activate the "Superforts," the ships were towed to Tucson's Municipal Airport where over 3,000 workmen stripped off the plastic cocooning material. The planes then were given a complete overhaul. Instruments, fuel lines and electrical circuits showing any deterioration were replaced, and radios, bomb bay tanks, life rafts and other easy-to-remove equipment originally taken out of the bombers were replaced. This reactivation work was carried out by the Grand Central Aircraft Company in three huge hangars at the airport. The original contract was for $6,250,000 for an undisclosed number of aircraft. The Air Force contract called for the job to be completed by late October or early November of this year.

# Flying Cowboy

***Hard-ridin' movie cowboy Autry is safety-minded flyer in real life***

## By PAT MURPHY

In his movies Gene Autry is the hard-ridin' two-fisted adventure cowboy whose middle name is danger. As a flyer, it's another story—Gene couldn't be more unlike his screen counterpart. Safe, Sane and Safety First are bywords of the Flying Cowboy in real life.

To him flying is no mere sport, it's a necessity for the efficient and economical conduct of his numerous professional and business enterprises. For that reason as well as the more obvious, Autry takes no chances on his flying equipment, personnel or weather.

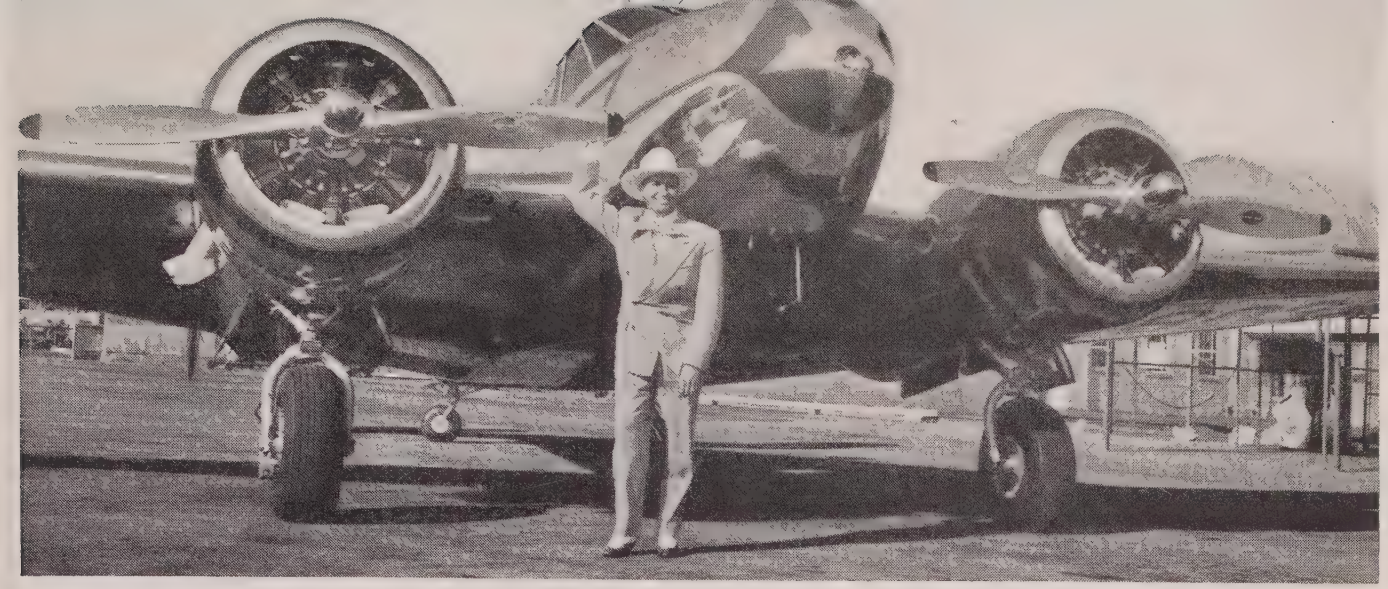
"Autry Airline," is a three-man operation led by Autry himself. He's been flying for 14 years and holds an ATR ticket. The other two are former executive transport pilot, Herb Green, and crew chief, Jim Clark who is also a pilot. Their airplane is a silvery Twin-Beech now three years old. In it Autry logs almost 400 hours per year.

Herb Green joined the cowboy some three years ago for six weeks of one-night stands and he's been with the "firm" ever since. On long cross-countries, Autry and Green alternate at the controls. Normally, on take-off, landing or instrument let-downs, both Gene and Herb are in the cockpit. When traveling is Autry's only time off-stage—during a long personal appearance tour, for example—Gene catnaps in back while Herb rides the cockpit.

"Autry Airline" makes it a practice never to fly known extended icing conditions or through thunderstorms. Ordinarily, the Twin-Beech cruises along at a nice 200 and at a comfortable 8,000 to 10,000 feet altitude. Recently, however, on a trip from Denver to Hutchinson, Kansas they ran into a dust storm and were about to try to turn back when Autry decided to climb another thousand feet. This he did—and the Beech rode it out in absolute comfort.

Although the Twin-Beech carries a gas load for seven hours, the boys alone never fly a stretch of

**GENE AUTRY** holds an Air Transport Rating, has been flying for 14 years. His prize plane today is Twin Beech



**TWIN BEECH** that Gene Autry flies airline style is hangared at Burbank Airport, 20 minutes from his home

more than six hours, and with a full complement of passengers plus baggage, they put down for gas every four hours or so. Under normal weather conditions they fly airways routes, but in contact weather they go direct, either by dead reckoning or ADF. The ship has just about everything in the way of instruments and radio equipment, including Omni.

"Autry Airline" keeps in repair and ready at all times two extra Pratt & Whitney *Wasps* for engine replacement every 700 hours. This, plus the job of maintaining the Beech in tip-top condition and working on ideas for improvements which Gene dreams up, is Jim Clarke's part of the operation. When Gene found himself doing much of his flying at night, crew chief Clarke, at the cowboy's suggestion, rigged up an airline-type lighting system to cut down the glare. Another of Gene's ideas is a hot air blower which hooks on to the heating system and melts any ice on the windshield, making it possible for the pilot to see outside conditions even when the thermometer is registering 36° below zero as it did once last winter during the Autry tour.

Back in 1935 when he was just getting started in movies, Gene was making a personal appearance in Dallas, Texas when he received a wired invitation from Rudy Vallee to appear on the latter's coast-to-coast broadcast from Hollywood. The only way the cowboy could possibly make the show would be to fly. Up to that point he'd never set foot in a plane and he carefully weighed the advantages of an appearance with Vallee against his reluctance to leave terra firma. The former won out. From the moment he arrived in Hollywood after the easiest trip he'd ever made in his life, he was air-minded, and the following year acquired his own *Monocoupe*. This was the airplane in which he learned to fly.

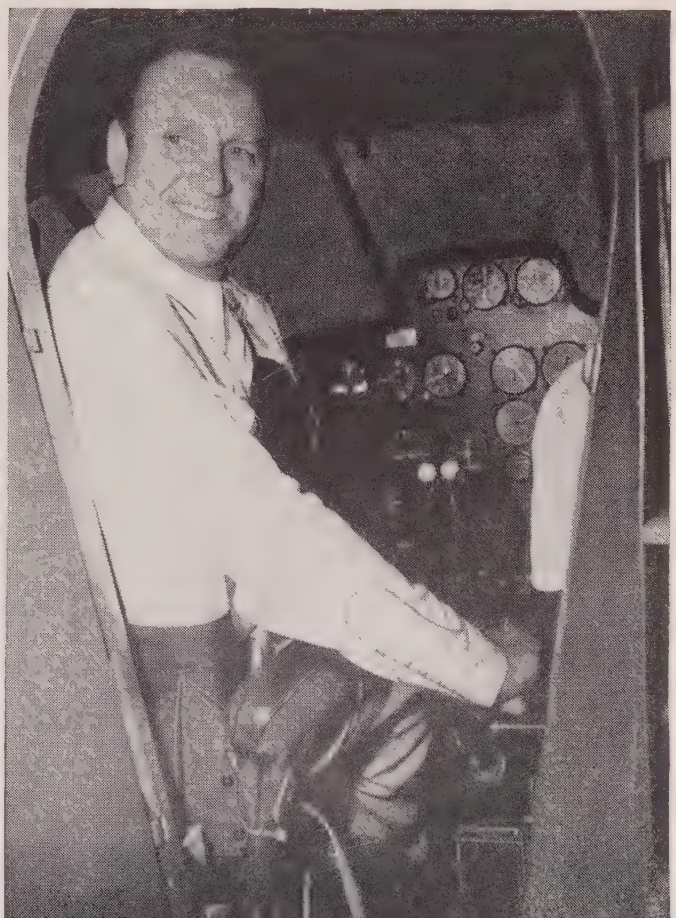
"I really learned to fly in the Army, though," the cowboy recalls today. "In the ATC I met up with a couple of veteran airlines pilots, Captains Hal Murray and Clarence Chiles. They taught me what it was all about . . ."

In three years in uniform (he wound up as Flight Officer) Autry flew in a wide variety of aircraft but most of his experience was in C-47's. He learned navigation and weather flying not only in the States but also in Africa, the Middle East and India.

Today the whole Autry (*Continued on page* 39)

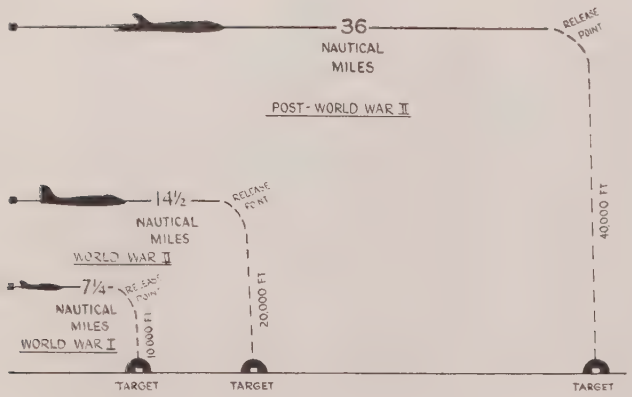
**FLYING COWBOY,** shown here at controls of Twin Beech, spent three years in AF, flew cargo, supplies for ATC





# Aerial Triple Threaters

***Today's Air Force combines three: navigator, bombardier, radarman***




**BOMB RUN** in World War I was made at 10,000 feet; during World War II it was made at 20,000 feet. Today's jets make it from 36 miles out at 40,000 feet

**INSTRUMENT** that is combination of radar and mechanical computer is the APQ 23. Here, Capt. Lewis is at the scope

## By JOSEPH STOCKER

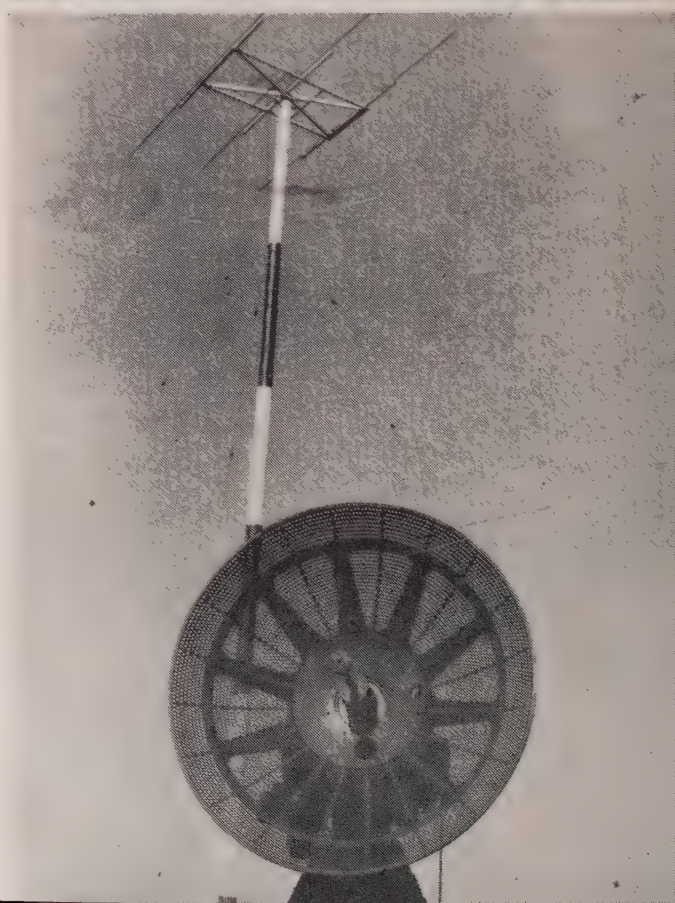
THE B-25 *Mitchell* bomber was plowing high across the San Francisco Bay area. Directly below sprawled the docks of San Francisco itself. They jutted out from the shore like the teeth of a giant comb . . . or so they might have seemed to the young Air Force officer hunched there in the semi-darkness of the radar compartment if he had taken time to peer through a crack in the drawn curtains.

But he was too busy for that. And, anyway, he didn't need to look through the curtains. He could see everything he needed to see by the magic of electronics. For all it mattered to him, the B-25 might have been flying over a heavy cloud layer or through fog as thick as whipped cream.

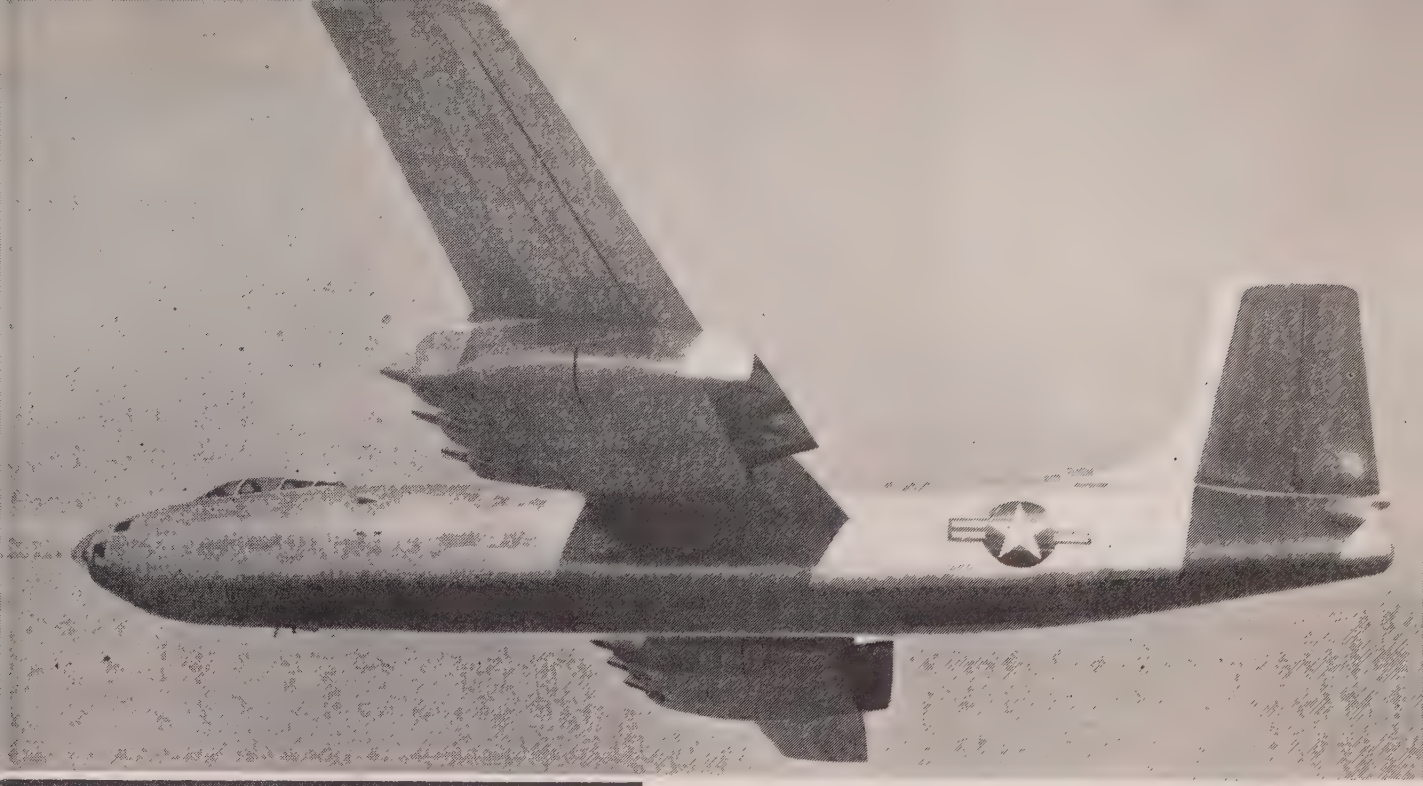
His radarscope directly in front of him told the whole story. It showed him the docks just below, the majestic San Francisco-Oakland bridge sweeping across the bay and, dead ahead, his "target"—one of San Francisco's most famous landmarks, the Mark Hopkins Hotel.

Now the taut silence of the intercom was broken. "It's your airplane, Radar!" With this from the pilot, the bomb run had begun. The young man muttered, "Roger," and leaned in toward the weird maze of knobs and dials and switches all around him.

He twisted a knob here, another there. He pressed a button and a green light came on. All the time he kept his eyes on the radarscope.



**ELECTRONIC** gaze of this radar antenna reaches out through fog, rain and darkness to locate aircraft long ways away



**POST WORLD WAR II** jet bombers such as Martin XB-48 *(above)* must begin their bomb runs a distance of 36 miles from release point. World War II's B-45 *(left)* began its bomb run 14½ nautical miles out from the bomb-release point

Suddenly the green light went off. The young man spoke quietly into the intercom. "Bombs away."

But no bombs tumbled from the belly of the B-25. The Air Force, after all, isn't in the business of smearing San Francisco's hotels all over the map. Instead, at the exact instant of release, an automatic radio signal was transmitted from the plane and picked up by a radar target computer station below.

The station's calculations recorded a direct "hit." The young officer in the shadowy interior of the airplane had accomplished his mission, "destroying" a target he had never seen.

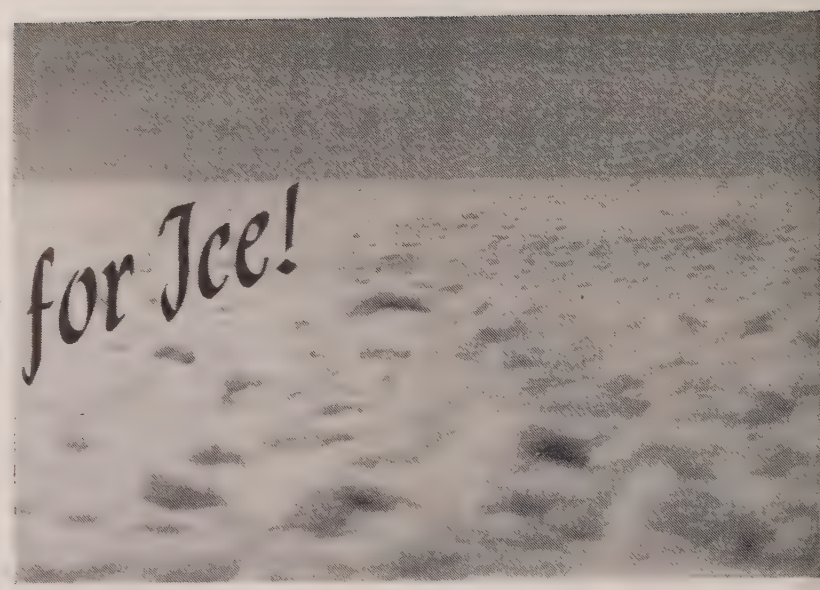
This "dry run" on San Francisco's famous "Mark" had had its inception that day at Mather Air Force Base, 12 miles east of Sacramento. And the young man crouched behind the small, tubular radarscope was one of many hundreds of officers being trained at Mather for a new, complex and exacting job—that of being Uncle Sugar's aerial triple-threat men.

What makes it complex and exacting is that it combines three different jobs in one, each of them a precise science in itself. The triple-threat man is at one and the same time a navigator, bombardier and radar operator. And it's a new job because of the advent of such new postwar bombing planes as the controversial mammoth, the B-36, and the jet B-45 and B-47, all of them flying (*Continued on page 47*)

**STUDENT** navigators get a work-out in their C-54 "flying classroom." Here they plot courses while officer checks

*Pilot tips that tell how to handle "ole debbil ice" and stay on safe side of flight*

# Watch Out for Ice!



By W. A. DIXON

THOSE cold blasts sweeping down from the north are the real stuff now and, as the saying goes, it will get worse before it gets better. So, unless you are strictly a sunny day flyer, it will do no harm to review once again the old subject of icing, even if you have flown through umpteen winters.

Without becoming too technical we can recheck a few of the more interesting fundamentals and then look into some actual cases of icing at work. We can't cover the subject with all its ramifications, of course. That would call for a book.

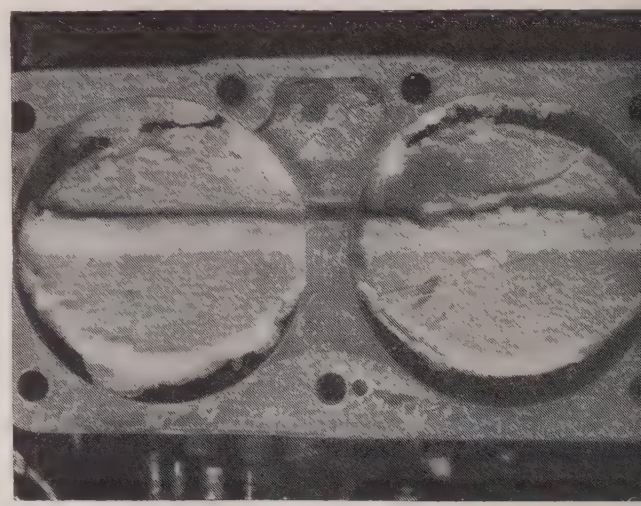
Right off the bat there are a couple of conditions which *must* exist before icing is even a threat. The air temperature at flight level must be near 34° or below (evaporational cooling over the wing or prop may lower temperature two or three degrees to freezing's 32°), and water must be present in visible form, except for the formation of carburetor ice or frost. We won't devote too much time to those two exceptions as most pilots know carburetor ice can form from the expansional cooling of a carburetor's venturi action even on a relatively warm day as long as there is sufficient moisture in the air. And the average pilot is impressed early in his flying career to never take off with frost on his plane since it adversely affects the air flow across the wing. It is possible for frost to be collected in flight when descending from a cold subfreezing level into warm, moist air, but the greatest frost danger comes to a plane which has been left out on a clear night when relative humidity is high and the air temperature below freezing.

If the two above-mentioned conditions for ice are in evidence, *i.e.*, moisture and freezing temperature, you may meet either clear (often called glaze) ice or rime, or a combination of both. Clear is the toughest hombre by far. It it most prevalent near the freezing line. Smooth and glassy in appearance, glaze ice is tenacious and hard to break or crumble. If you can manage to reach out your side window and grab a handful of ice, you can determine by examination if it's clear ice, rime—or both.

Freezing rain, that most ominous enemy of all, is clear ice, pure and simple. Such ice has been known to form at the rate of an inch a minute. In 1940 near El Paso, Texas, a United Airlines' captain reported an accumulation of five inches of ice in three minutes. Ice is tricky as the devil! You can be cruising comfortably along, suffering just a little ice, and then—wham! It's wicked for a minute or so, but after you buck through that area, it calms down again.

The surface counterpart of such a condition is where a general snowfall or light ice storm is

**CARBURETOR** ice can build up on a warm day. Note this fuel evaporation ice formation around butterfly valves



broken willy-nilly by areas severely stricken by freezing rain. Sleet, which is water already frozen solid before it hits, drops out of the same basic weather machine that produces freezing rain or drizzle, but sleet is not nearly as treacherous. To create sleet, rain or snow falls from a higher cloud deck through a warm level and melts, then freezes almost instantly into sleet when the much colder surface air is reached. Sleet won't affect the flight characteristics of your airplane but it is a stern warning to stay where you are and not to venture into the ice factory above. The opposite is true for freezing precipitation. In other words, you climb to escape from the ice-laden air into the warmer, above-freezing air above.

All this points suspiciously to ice as a formidable opponent—one worthy of lots of thought, planning and study by the wise pilot.

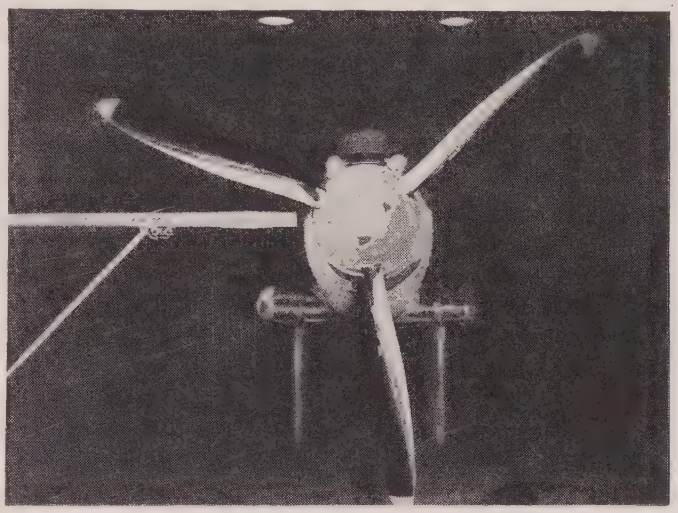
Rime ice isn't as mean as clear, mostly because it forms more slowly and is easier to combat with standard de-icing and anti-icing equipment. It is of a granular nature (crumbly and rather sandy-like) and is normally removable by vibration or shock, such as revving the props or de-icer boot action. The colder it is, especially below 15° F., the more likely the ice will be rime. In turbulent air, however, clear ice may be found at almost any temperature.

As a general rule, rime is associated with stratus-type clouds; clear ice with cumulus. Cumulus clouds contain the sustained up-drafts to build large, heavy water particles. These big, dense super-cooled drops don't all freeze instantly but keep the leading edges of a plane's structure covered with a film of water which freezes from the inside out. About this word *supercooled:* have you ever spent your nickel for a tempting, cold bottle of Coke from a dispenser, and then had its contents freeze instantly when you picked it up? That Coke was *supercooled;* the individual droplets were still in a liquid state even though their temperature was below freezing. In this state, the slightest disturbance will change a liquid to a solid—ice. In a *supercooled* cloud, the moving airplane furnishes the disturbing element.

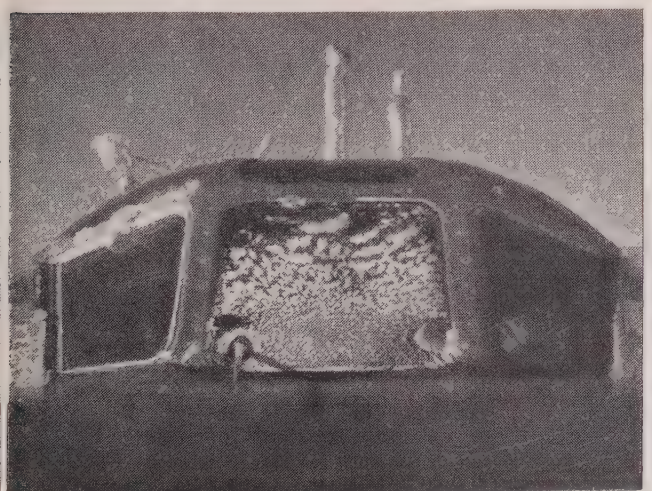
No matter clear ice or rime, it's the disruption of the airflow past the wings and prop which is the source of the chief trouble, not the weight of the ice. Of course, an additional difficulty is that any type of ice accretion may restrict visibility by blinding the cockpit windows.

Eighty-five per cent of all icing is associated with frontals. So if you steer clear of fronts and keep under the clouds, you will have little to worry about—except freezing rain or drizzle! Pertaining to the latter, I remember flying to Amarillo, Texas, from Alliance, Nebraska, during the war. We had six C-47's in formation and were on a contact flight plan. It was February and (*Continued on page 48*)

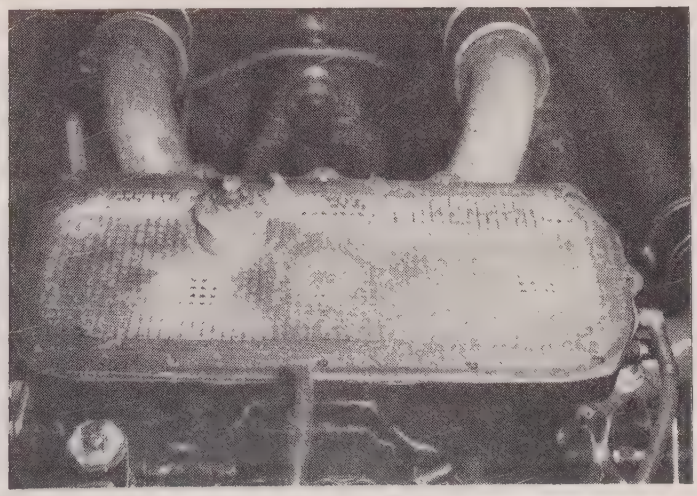
**TEST PHOTO** shows typical example of prop and spinner ice after 15-minute run at 20° F and at 120-mph speed



**WINDSHIELD** that is unprotected can take on great quantity of ice. Note two protected panels are ice free.

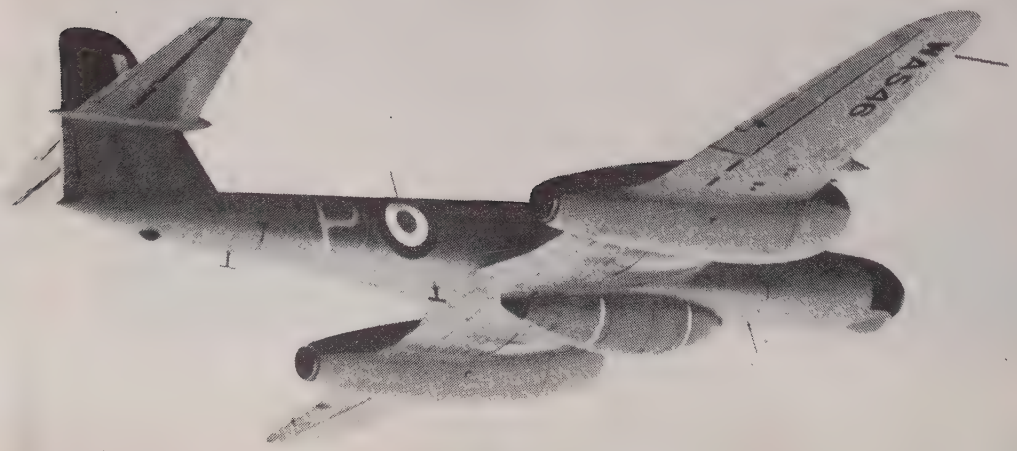


**IMPACT ICE** on carburetor screen looks like this. This is typical of impact icing of the induction-system parts

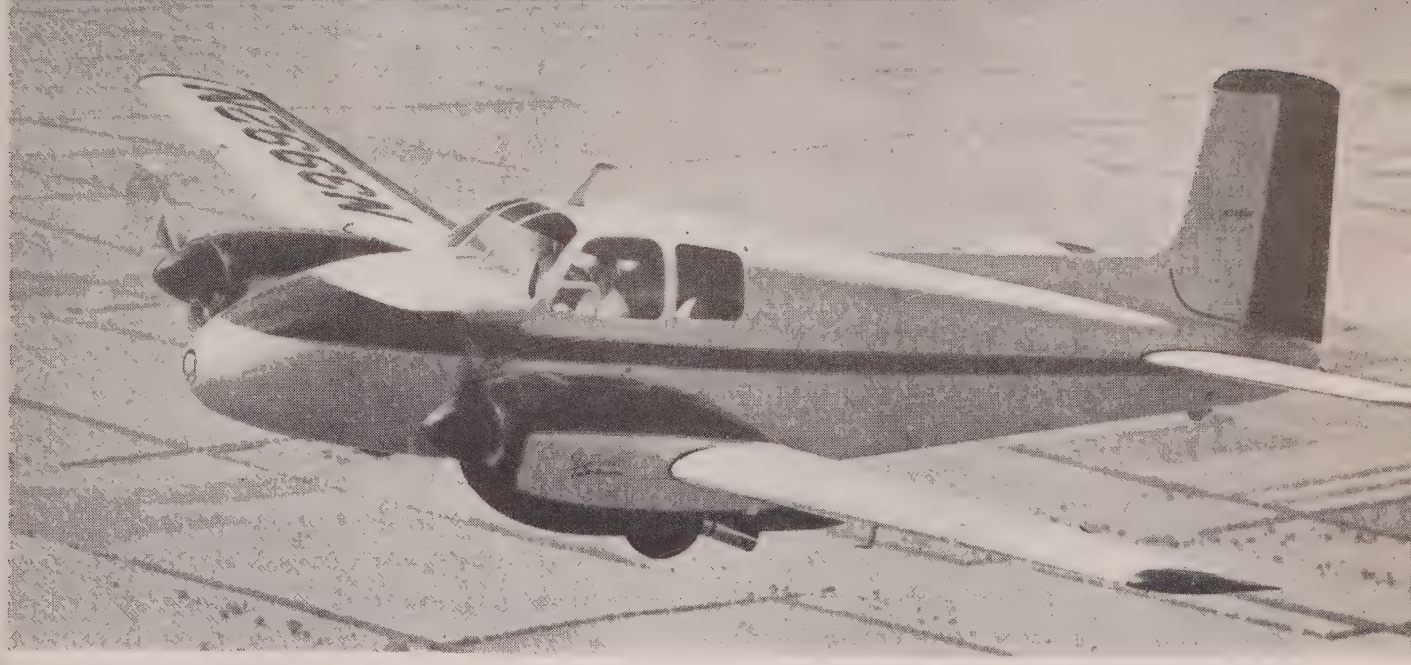


**PIPER PACER AMBULANCE** version of the popular four-place lightplane has been announced by Piper Aircraft. Developed for either civil or military use, the *Pacer* Ambulance carries one patient, a pilot and a nurse. The litter, a lightweight Storm Lake, is loaded through left-hand rear door with the foot placed on right front seat after seat back has been removed. Head of litter rests on back of rear seat. Only special equipment required is two clamp-on tie-down straps.

**FLIGHT HOME** took Max Conrad. 47-year-old pilot, from Teterboro, N. J., to Switzerland in his Piper *Pacer*. Conrad's wife and children live in Switzerland. He plans to fly back in *Pacer*, too. Trip over was made in 800-mile hops.



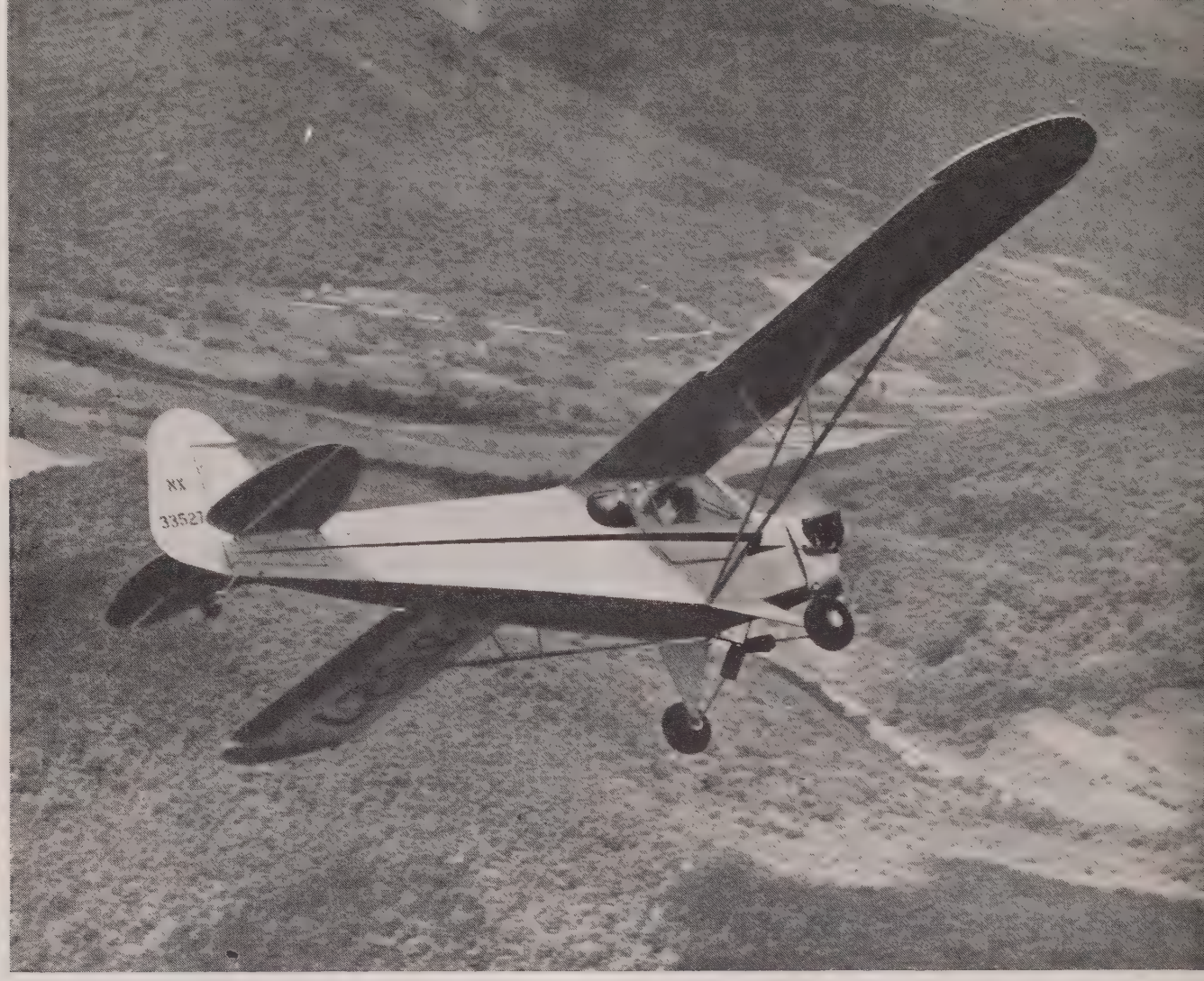
**RADAR STATION** that flies is what officials call this Armstrong Whitworth NF-11, said to be "world's fastest jet-propelled night fighter." Plane was designed to prevent an atomic Pearl Harbor in Europe. Elongated nose houses radar equipment. Note the ventral fuel tank under plane's fuselage, and one of fighter's four 20-mm cannon outboard of NF-11's right-hand jet unit.



**FLYING PROTOTYPE** of Beechcraft's new *Twin Bonanza* is shown here in the new plane's first aerial photo. Now going through final tests, the *Twin Bonanza* has been subject to considerable industrial and executive interest. Powered by two 260-hp Lycomings, it cruises at 191 mph, has 935-mile range, and carries six people, plus luggage.

**BELL AIRCRAFT'S** new E-47 helicopter is shown here demonstrating its carrying ability. Pilot is setting wooden beam into position in flight. The E-47 is powered by 200-hp engine, can carry three to five men or 900 pounds cargo.

**DOUGLAS SBD,** once a war surplus, is now a favorite plane in skywriting stable. Turbulence at 10,000 and 15,000 feet often wrecks sky-written words. To avoid this, Skywriting Corp. outfitted this SBD as a high-altitude writer to be used at 20,000 and 25,000 feet. Modification included fuel pump to pump smoke liquid.



**INSTRUCTOR** to student: "Watch your wing . . . not so much rudder . . . watch your nose . . . Hey, you've lost the horizon"

# No Brakes On My Side

By V. A. PREVETTE

REMEMBER the lightplanes in which the instructor sat, brakeless, on the righthand side? His students were free to taxi over dogs, relatives, the corner of the hangar, the gas pit, other airplanes and even—on very rare occasions—the taxi strip.

This situation met with no approval on my part when I emerged from the safe and supervised state of learning into the status of flight instructor. Obviously, I thought, the instructor should have the brakes. Note: This opinion has altered only slightly.

When I reported for work my chief pilot warned me. "You're not going to teach flying, bud, you're going to learn to fly!"

This did nothing for my confidence. However, just as the first flight is not what one expects, the first taste of flight instructing was radically different from what I had anticipated. It seemed to boil down to telling the student to put one foot here and the other there, these are the brakes (leave them alone), and here's the throttle.

With the exception of occasionally trying to taxi off with the tail still tied down, and other details damaging to my dignity, everything went smoothly on that first job. Just as the chief pilot had said, I learned right along with the students. Even with limited experience the pattern of errors soon became easy to recognize for each maneuver. Fortunately, there is a limit to which a maneuver can be mangled. Flight instructors don't have to be

brilliant at all. In fact, when a small boy told an instructor admiringly, "I'm going to be a flight instructor when I grow up," the instructor sadly admonished the lad, "Go to school, boy—learn to read and write and you won't *have* to fly for a livin'."

Actually, an instructor would not trade his life for any other, unless forced into it. To say that I enjoyed the winter would be gross understatement.

When the Florida winter season was over, I moved North to Washington, D. C., for summer flying. My first assignment was to check out a pretty, dark-haired girl. She led me proudly to an ancient Aeronca, closely related to the C-3. After a few landings, the little pilot seemed to have everything under control. I climbed out and went over to the edge of the runway to watch. The airport owner strolled up to talk to me. I was eager to make a good impression so tried to look as much like a cool, efficient pilot as possible. He stood talking with his back to the runway as I watched my girl tear down the field, bound off the runway, down a hill, across a gully and out of sight. Praying that she was in the air, I waited—trying desperately to control my expression. At long last, she soared into view. Apparently unconcerned over her unconventional take-off, she circled the field and plunked the old Aeronca down safely enough.

In the months that followed I think I was put into every flight attitude known to aviation. I learned, however, that no matter what weird maneuver came about it was just a variation of either straight and level, turns, climbs, glides or stalls. With practice, nothing bothered me. Especially interesting was the fact that the lightplane itself could get a student out of almost any odd maneuver.

The number and variety of people learning to fly is amazing. No matter what their aptitude or age they all seem to be able to learn to fly. The

**NIGHT FLYING** is new thrill to pilots, but many instructors won't teach night flying in single-engine airplanes

**STUDENT'S** first solo is as much of a thrill to the instructor as it is to student *if* student is well taught

**BRAKES! CONTACT!** And the instructor pulling the prop through hopes his student doesn't pull a Dilbert on him

only people that I feel should not fly are those whose judgment is not good. These persons may never be able to fly safely because of their emotional instability. Their flying is marked with a dashing carelessness and a tendency to "buzz." Their piloting is meant to impress. It impresses me as being a threat to the equipment.

In addition to learning more about daylight flying, I became acquainted with night flying. Our night-flying set up was exhilarating to say the least. Though the equipment was "approved" it was very nearly useless. A big floodlight lit up about 300 feet of runway, then the runway sloped but the floodlight didn't. The reflectors, originally supposed to outline the runway, might have worked once. But in spite of patiently set- (*Continued on page* 38)

**CREWMAN** of Fairchild XC-120 climbs collapsible ladder to get to crew nacelle. Ladder folds up into the cockpit

# Pack Carriers for Cargo

By RAY CANTWELL

ONE of the most promising aircraft developments of the present day is the detachable cargo pack. It appears to be the answer to the need for an airplane that will place cargo service and passenger service in two separate and distinct categories. The present-day passenger aircraft does not lend itself to the basic rules for effective utilization to the cargo industry. The features of the cargo-type airplane has to include such prime requisites as ease of loading, ease of maintenance and low cost of operation.

The detachable pack compartment has been developed to satisfy the needs of the cargo field to

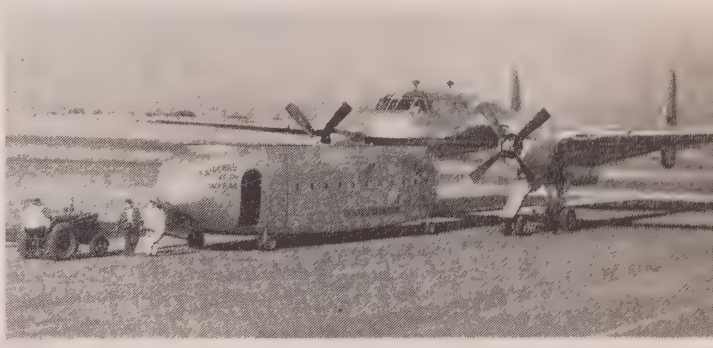
allow aerial transports to operate on the same efficient principles known to the commercial trucking concerns and the railway system. The basic advantage of the commercial trucking companies is the operation of a small number of tractor or power units in proportion to a large number of cargo units or trailers from a centralized terminal. This method of operation decreases the cost of high-priced power units and keeps them in operation while the low-cost trailer units are being loaded or unloaded. Of secondary importance is the allowing of maintenance and servicing of the tractors without impairing the service and efficiency of the operating agency.

Air Materiel Command engineers have developed such a pack airplane in the Fairchild XC-120, a modification of the C-119 *Packet* now in service with the Air Force. On this design, the fuselage or "pod," analogous to a trailer in commercial trucking concerns, is detachable from the airplane or "Carrier" and is referred to as the "Pack." The method of attachment uses a modification of the ball-and-socket joint design to accomplish the desirability of having fittings on all types of packs interchangeable within the weight-carrying capacity of the carrier. The "carrier" is designed with a flat bottom, with the top of the pack drawn as close to the carrier as the fittings will permit. All the equipment necessary to the flight of the aircraft, *i.e.*, controls, air-conditioning, hoists to raise and lower the pack, etc., are contained in the carrier, thus allowing the pack to be independent for ground transporting. The flight characteristics of the carrier are similar, with or without the pack.

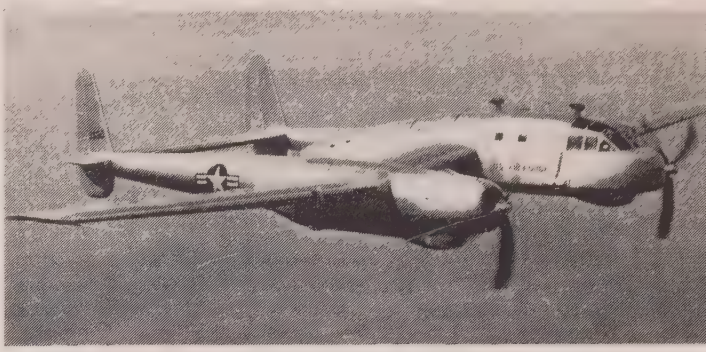
The pack, for military, is envisioned to serve as: (1) Personnel transport to carry paratroopers, combat troops and other personnel, (2) Cargo carrier, (3) Tanker for fuel, oil and other chemicals, (4) Mobile radar control for communication, radar or weather stations, (5) Maintenance unit containing complete machine shops for air or ground equipment repair, (6) Hospital or first aid station that can be moved to disaster areas, and (7) Shelters for photograph-processing laboratories, supplies, personnel, command posts, etc.

The Fairchild XC-120 is fitted with a conventional aluminum sheet and stringer pack in the 5,000-pound cargo-load class and having outside dimensions of 11.5 feet wide, 10.2 feet high and 53 feet over-all length. The inside capacity is approximately 2900 cubic feet with a floor loading of 200 pounds per square foot having 9.1 feet width, 8 feet height and 37 feet usable length. The variation in length of the outside to the inside dimension is due to the *(Continued on page 51)*

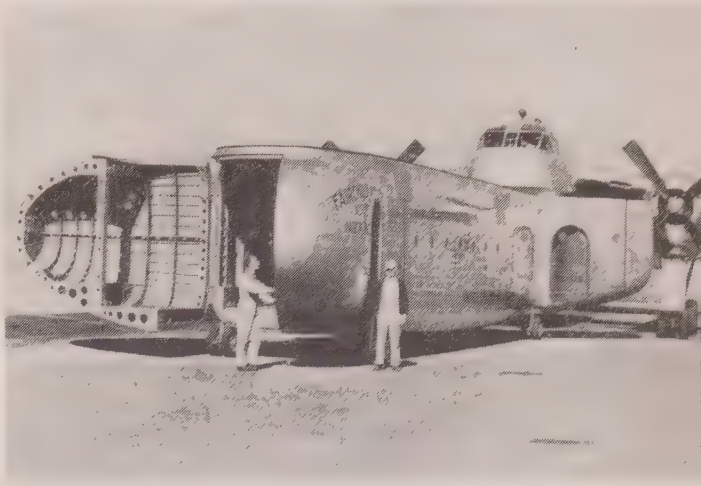
**FAIRCHILD** XC-120 with detachable fuselage is shown here in flight. Adaptation would meet commercial cargo needs



**CARGO-CARRYING** pod is easily detached from *Packplane* and can be towed from beneath *Packplane* on its own wheels



**PACKPLANE** minus the pod handles as well as with the pod. Designer of this new type aircraft is Armand J. Thieblot



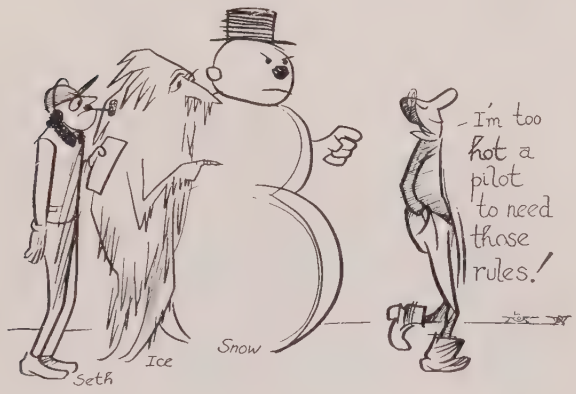
**POD** of the XC-120 has 2700 cubic feet of cargo space. Large clamshell doors facilitate loading and unloading.

# DILBERT

By S. H. Warner and R. Osborn

**Winter Safety Hints**—Every winter it's the same old story: frost, sleet, hail, snow and ice—and a lot of unnecessary aircraft accidents. In case you are interested, the record shows that winter flying offers little extra hazard for those who rigidly adhere to the following safety rules.

1. Get all available weather information before each flight, and plan your flight to avoid altitudes




where icing is prevalent.

2. If you should encounter instrument weather while on VFR, *don't push through!* This is the largest single cause of winter accidents. Land at the nearest field where visual conditions prevail. Occasionally this will mean a hayfield instead of an airfield.

3. Just before take-off, be sure to check all controls for free movement, and clear your engine thoroughly.

4. Never take off with snow or frost on the wings. A very small amount can destroy your lift.

5. Check runway conditions with the tower before landing. Icy spots on runways cause many a groundloop and nose-over.

6. By all means, learn the way to operate every piece of de-icing equipment on your airplane *before* you get in the air. Don't leave learning to later.

7. Don't let ice in the pitot tube foul you up. Use pitot cover when securing. Use pitot heat in freezing or near freezing weather.

8. Brakes are of little help when taxiing on icy areas. Taxi *slowly* and allow extra stopping distance.

**Snow Will Fool You**—It made a fool out of Dilbert. He tried to land on a field covered with a three-inch blanket of the stuff. He misjudged his height and dropped in from about 15 feet. Instead of bouncing, the plane just sort of shuddered and spread apart.

Under some conditions of visibility, snow makes depth perception very unreliable. In such cases, a snow landing becomes very much like a glassy water landing. It is a good rule to land fast on snow, with tail high. If the snow is deep enough to cause a nose-over, this will occur only when speed has been reduced sufficiently to allow the plane to settle. A nose-over can often be prevented under such conditions by holding the stick back, and using power to blast the tail down.

In take-off from snow-covered areas, it is good practice to take off tail (*Continued on page 50*)

"Go straight, young man . . . or go west!"

# CAOA REPORT . .

**CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.**

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. The CAOA headquarters are located at 444 Madison Avenue, New York 22, N. Y.

### *Flying the Dove*

Cole H. Morrow, J. I. Case Co. chief engineer and chairman of the CAOA Technical Committee, had an opportunity to fly the De Havilland *Dove* used as an executive aircraft by the British Embassy in Washington. The occasion was the International Air Fair recently held in Detroit. Here is his brief "pilot's report":

"The performance characteristics of the *Dove* are quite good, particularly when its low horsepower is considered. The two D.H. *Gypsy Queen* engines are rated at 345 hp each on the take-off. Each is supercharged and turns 2700 rpm. Cruising rpm is 1900. The engines along with the three-bladed full-feathering reversible-pitch propellers are amazingly quiet both in the airplane and from the ground. The *Dove* has been certificated for a gross of 8500 pounds, and I understand the empty weight is about 5400 pounds.

"During the flight we used normal cruising power and indicated about 159 mph at 3,000 feet. I understand the total fuel consumption at this cruising speed is about 30 to 32 gallons per hour. Single-engine performance is quite good. At the time I flew the aircraft there were eight people aboard and 160 gallons of gas in the tanks. We were able to maintain at IAS of about 120 on one engine using only maximum cruising power. I made turns up to 30° both into and away from the dead engine with no difficulty.

"This airplane will undoubtedly attract considerable interest as an executive plane, and the following features will be of particular interest to prospective users:

(1) The large entrance door.

(2) Level cabin on the ground due to tricycle gear.

(3) Very large windows placed low enough for good passenger visibility.

(4) Large and easily accessible lavatory.

(5) Very low sound level in the cabin and no apparent vibration.

(6) Large baggage space accessible from the outside.

(7) Good appearance.

Some of the things that will not be particularly liked by American users will be mostly from the pilot's standpoint. These include:

(1) Cramped pilot's compartment.

(2) Differential brakes operated by hand from the control column.

(3) Heat in the pilot's compartment through the plastic cockpit canopy.

(4) Maintenance of the plastic canopy.

(5) Availability of parts and supplies.

"All in all, however, the *Dove* appears to be a very good 'aeroplane' and, as the CAA has agreed to accept the British Civil Air Ministry's certificate of airworthiness, it will undoubtedly attract considerable attention among executive users in this country. This interest might be increased if the availability of comparable U. S. aircraft (we have no 'opposite number' in its exact weight and power class, passenger capacity, etc.) should be reduced due to war production, and if parts and supplies should be made readily available through De Havilland Canada."

### *Radio Telephone*

During the first week of October, several hundred companies (including CAOA members) which operate executive aircraft were queried on the subject of obtaining special frequencies for aircraft-to-ground radio-telephone service.

The response was overwhelmingly in favor of further exploring the project, including joint action with Air Transport Ass'n.

As frequencies in the 300 to 400 mc (UHF) band have been tentatively suggested by the FCC, it is of interest to note what services now operate in that section.

Government Services, 225-328 mc; Aeronautical Radio Navigation Services (glide path, etc.), 328-335 mc; Government Services (certain undisclosed public civil facilities); Radiosonde, 400-406 mc; Amateur Radio, 420-450 mc. To date, very little equipment is in operation in any of these bands. But this is known—some adjustments will have to be made if, as and when the obstacles can be overcome and the suggested plane-to-ground service set up.

### *New Members*

A number of applications for membership in CAOA are reported in progress as we go to press. The following recently were accepted as members:

*Price Battery Corporation*, Hamburg, Pa., manufactures electric storage batteries, with main factory and a second plant in Hamburg, and other plants in Atlanta, Georgia and Medford, Mass. This company operates a Beechcraft D-18S, based at Reading. J. A. Finley, Jr., is chief pilot.

*Smith-Douglass Company, Inc.*, Norfolk, Va., is in the fertilizer business. The company has operated aircraft since June, 1946 and now has a Lockheed *Lodestar*, based at Norfolk, and a Beechcraft B-35 *Bonanza*, based at Streator, Illinois. C. B. Owen, Jr. is the chief pilot.

### *"Flying with Sinclair"*

This is the title of an attractively printed booklet designed to give information on Sinclair Oil's executive transport pool of Beechcraft Twin D-18S airplanes. It was prepared under the direction of H. W. Boggess, Director of the Aviation Department, Sinclair Companies, Tulsa, Okla., for the passengers who ride the Sinclair planes.

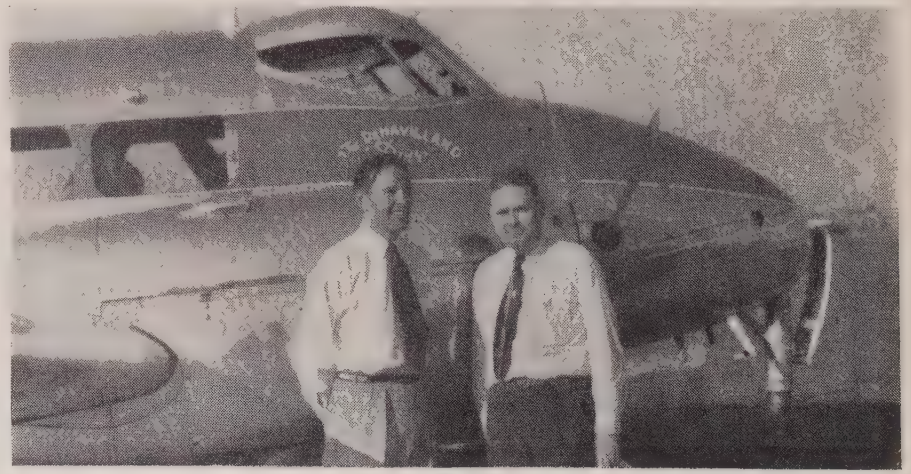
Following a page on the company's aviation policy, *i.e.* Safety, Service and Economy, brief descriptions are given of the airplanes, the planes' automatic controls, radio, instruments, weather and navigation, followed by details of the company's scheduling patterns. Photos and career summaries of Sinclair's pilots conclude the booklet.

This company is to be congratulated on getting out such a useful and informative brochure. It has been called to the attention of other companies who have inquired at CAOA Hq for information on such booklets.

### *Insurance Coverage*

Jerry Lederer, Director of Flight Safety Foundation, reports that since the Korean crisis the aviation and insurance departments of many corporations operating executive aircraft have been going over their hull insurance coverage in the light of possible increased replacement costs and new radio equipment which may have to be added.

**CAOA PILOT** Cole Morrow of J. I. Case Co. flew the De Havilland *Dove* for "pilot's report." Morrow is shown here (below right) with Russ Bannock, pilot for De Havilland



# Flying Omnirange

(*Continued from page 13*)

advantages which make aerial navigation so simple and certain that pilots can devote substantially more time on their primary job of flying.

The name omnirange comes from the Latin "omnis", meaning "all", and refers to the fact that courses are transmitted in all directions. This, of course, makes off-airway navigation just as certain and reliable as flying on an airway—a boon to pilots of small personal planes as well as airline pilots.

The omnirange operates in the very high frequency (VHF) part of the radio spectrum, between 112 and 118 megacycles, where static and other atmospheric interference is almost non-existent.

The VHF part of the spectrum has another interesting characteristic with which many television and frequency modulation radio listeners are acquainted. VHF transmissions follow a "line of sight" course—the signal will not travel much beyond the horizon. That is why television and FM radio transmitting antennas are placed atop tall towers or buildings on the highest possible ground.

Such spectacular locations are unnecessary with omniranges, which transmit to receivers in aircraft high above the earth instead of receivers on the ground. Under ordinary circumstances, the omnirange signals can be received at 30 miles by aircraft 500 feet above the ground, and at 100 miles or more by planes at 5,000 feet. Maximum reception distance is approximately 200 miles at 20.000 feet.

The omnirange receiver varies in price from about $400 for the small-plane type to several times that figure for precisely-engineered airline equipment, and is connected to four basic instruments in the cockpit.

One instrument is a radio dial for tuning in the particular omnirange desired. This operation is exactly the same as tuning in a broadcast station on a home radio.

The second is the "bearing selector," graduated from zero to 360°, as on a compass. This can be turned to any bearing desired.

The third is a round dial with a vertical needle, hinged at the top, which moves to right or left. And the fourth is a "to-from" indicator which does just that—tells the pilot whether the bearing shown is to or from an omnirange.

Basic use of the omnirange receiver is simple. Let us suppose that the pilot decides to fly to a particular city. First, he looks at a recent aeronautical chart, which shows the frequency and location of each omnirange. He then selects an omnirange close to where he is going, and tunes it in on the proper frequency. To be sure he has the correct range, he listens with earphones to the identification, sent out either in Morse Code or by voice recording.

Next, he turns his "bearing selector" until the vertical needle centers at the bottom of the round dial. He glances at the "to-from" indicator to be sure the bearing is "to" the omnirange. If it should be "from," he merely turns the bearing selector 180°, at which point the indication will become "to."

All that he then has to do is to fly a course which will keep the vertical needle centered. If it moves right, the pilot flies right to correct his course. If it moves left, he turns the plane slightly left until the needle is centered.

That is all there is to it. If he keeps the needle centered, he will fly directly over the omnirange. At that point, the "to-from" needle will flicker for a few seconds, then change to a "from" indication. If the pilot desires to continue in the same direction, he merely continues to keep the needle centered.

Nothing has been mentioned about correction for wind drift or correction for magnetic variation because by using the omnirange there is no need for correction. Keeping that vertical needle centered automatically "crabs" the plane into the wind just the right amount to fly a straight-line course to the omnirange. Magnetic variation is corrected in the omnirange itself—all its courses are in terms of the local magnetic field.

The omnirange bearing selector and the "to-from" indication always show correctly the *position* of the range in relation to the plane. But the "to-from" refers to the direction of the range, and not necessarily the direction in which the plane is flying. Thus, if a plane is west of an omnirange, a bearing of 90° "to" the station will appear on the receiver instrument whether the pilot is flying a 90° course or its reciprocal, 270°.

In practice, this need cause no difficulty. A pilot wishing to fly toward an omnirange can be sure he is on the correct course, rather than its reciprocal, by glancing at his magnetic compass. Even without the compass, a simple test will reveal a reverse course. If turning the plane toward the right, for example, moves the vertical needle to the right, instead of the left, it means the pilot should make a 180° turn—his course is the reverse of the one intended.

The fundamental use of the omnirange, can be learned in a few minutes by a pilot actually using the receiver. Confusion is almost impossible—he can read the bearing of the omnirange at all times on the bearing selector, and plain words tell him whether the bearing is "to" or "from" the omnirange. There are no quadrants to worry about.

Use of the omnirange is much broader than merely flying "to" or "from" a particular range, however. It is simple for a pilot to pin-point his position at any time. He does this by cross bearings.

As he flies toward an omnirange, the pilot knows the bearing of the omnirange by looking at the bearing selector. This gives him one "line of position"—he knows he is somewhere along that particular line. He can draw the line in a moment on a sectional aeronautical chart.

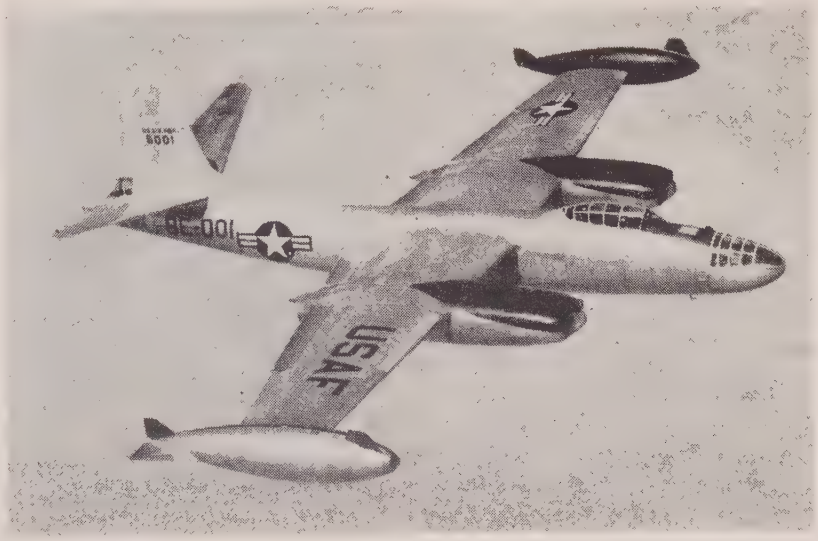
Holding that course with the magnetic compass, the pilot tunes in another omnirange to the right or left of his course. He turns the bearing selector until the needle centers. From the bearing selector, he can now read the bearing of the second omnirange.

Finally, he draws a line on his chart showing the second omnirange bearing. The point where the two lines intersect is his position—a navigational fix of considerable accuracy. Using this cross-bearing system, it is possible to pin-point small towns and even farms of several hundred acres. More important, it permits an accurate approach to a selected airport, even under adverse weather conditions.

The omnirange talks, also. On his earphones, the pilot can hear air traffic control instructions, and weather information at regular intervals. And he can hear replies from communicators on the ground to any request for information which he may send over his airplane radio transmitter. Thus he is in constant touch with CAA ground personnel who are ready to aid him in any possible way. If the pilot requests it, the CAA ground communicators will even work out his navigational problems for him as he flies along, sending him the results over voice part of omni.

For pilots of large executive-type planes, the usefulness of the omnirange is increased by two supplementary pieces of equipment—Distance Measuring Equipment (known as DME) and the Course Line Computer.

(*Continued on page 39*)




**AIR FORCE B-45,** four-jet bomber, gets a boost in range by the addition of wing-tip tanks. Each tank holds more gasoline than all the fuel tanks in World War II's famed B-25. Bomber's normal tactical radius of action is listed as "over 800 miles"

# No Brakes On My Side

(*Continued from page 31*)

ting them up straight each night they soon bit the dust again. To the hangar side of the runway were taxiways and fairly smooth ground; on the other side was a terrain not "designed" for aircraft. By using the reflection of light from the hangars, however, we managed pretty well and there were no serious mishaps.

To "help," the planes were equipped with certified landing lights out on the wing. Full of optimism, the pilots would turn them on, only to find them either pointing into the cabin, or in any direction but that in which the plane was going.

The people we meet are the most interesting items in an instructor's day. A dignity problem occasionally crops up—for example, the gentlemen in Homburgs and overcoats who choose to fly the company's smallest, most apologetic airplanes.

Then there are jolly people who are unable to make the safety belt come together. Valiantly they suck in their breath as the pilot endeavors to make ends meet. Finally, the chubby passenger becomes so securely wedged in that he can only be removed by tearing the airplane off his back. This always crops up during the Christmas season when Santa Clauses take to the air in the holiday spirit.

And the girls, God bless 'em! They love to fly and show implicit trust in pilots—while airborne at least. Coming in for a landing they breathe down the back of his neck, "Isn't this the cuuutest thing!" This ruins a pilot's judgment and encourages wheel landings since to land 3-point would mean pulling the stick back, possibly causing bruises to the female figure.

Tight skirts and open-cockpit trainers customarily result in a series of hilarious situations. Witness the pilot-owner trying not to look while the little lady puts her foot through the fabric.

Then there's the amazing sight of the crusty chief pilot who has a reputation for eating nothing but nails, but who purrs like a mangy old lion as a little cutie tells him what a thrill flying is.

Children, I found, are the most observant. They notice everything and are apt to interrupt your sales pitch to a prospective plane owner with, "Ain't that gas leakin' from that ole bucket of bolts?" Invariably, that "bucket of bolts" is the plane you're trying to sell.

It's hard for children to see in an airplane. The wise pilot digs up plenty of cushions to get their eye-level jacked up. Otherwise, they squirm out from under safety belts and are out on the strut before they can be nabbed.

As a flight instructor, my wholehearted admiration goes to the students. When spins were the vogue, it was the student who showed great valor. Flying for them was new and odd enough without deliberately going into a maneuver which closely resembled being flung down a spiral laundry chute. At first, to prevent the student from being worried, I approached spins with profuse explanations and apologies. By the time we got around to actually doing one we'd both be pretty near hysterical.

Eventually, I developed an easier method. I avoided mentioning the word "spin" at all. Instead I'd sneaked up on it via stalls. I'd teach a student how to stall normally and then "one wing at a time" by using the rudder to skid into what was actually a spin. Only after we had completed this maneuver several times would I tell the student what we were doing. On one occasion, before I told a student what we were really doing, he seriously remarked, "These one-wing stalls are O.K., but I don't think I'm going to like spins!"

Students seem to like the feeling of having a "tough" instructor. They get more vivid instruction and seem to have more confidence in him. Confined to a happy medium, this brought results.

An apparent contradiction that I discovered one day is that a nervous student is sometimes benefited by a period of extremely bumpy, rough weather. After an hour or so in which the plane is all over the sky, the student finds normal weather soothing. It acts as a convincing demonstration of the airplane's stability.

Another apparent contradiction was observed in teaching crosswind landings. Instead of beginning with a light crosswind, I found it easier to start out with strong, definite crosswind. Drift is easy to spot when a plane flys sideways across the runway. A student trained in mildly rugged weather has no trouble when such weather comes up while he is out solo.

Seaplanes entered the picture in the winter when I returned to Miami to work. The company there operated two white Luscombes on floats. These ships were very useful in Florida since there were few places in that land of sunshine and water where they could not be landed.

I found the seaplane an interesting experience. Whenever the controls were released, on the water, it weathercocked, obedient to the wind. This was helpful when trying to determine the best take-off direction, but coming up a narrow canal to the dock it played tricks on us. To complicate our problem in the event of a strong crosswind, we were not allowed to use too much throttle, because that tended to cause a wake which battered the yachts along the canal into the coral sides.

One day my eyes bugged out to see a white seaplane coming across the water toward the home dock, hell bent for election. A fellow instructor, George, had taken it out for a half-hour period. He swerved out of the bay into the canal "on the step" (meaning at least 40 mph). As he approached the expensive padded mahogany "tubs" moored along the canal he seemed to increase his speed. The yacht owners came flying out of their houses. George put on more speed. Now we could see what was happening—the seaplane was slowly sinking out from under him!

He jumped the plane up on the dock, scattering instructors and students in all directions. Then in many sulphur-tinged words, he allowed as how too many pilots had been taxiing the plane over sharp, coral-rock shallows which did damage to floats!

I hardly had an opportunity to grow into the faultless, super-pilot type of instructor. For instance, while taxiing out a landplane one afternoon, with the student at the controls and me under the dashboard looking for the gas valve, there suddenly seemed to be a great deal of shouting going on. I came out from under the dash in time to see students, lineboys and instructors falling all over the airplane. To my chagrin I also noted the left wing caught on a large red firetruck. We were stopped just before the prop connected—pulled back in a most undignified manner and pointed away from the truck.

When I returned, the chief pilot looked sad. "My achin' back!" he exclaimed. "Here I told those boys not to bring that truck on the field until they painted it red so that we could see it. The first day it comes back, look what happens!"

In spite of such details—having both extraordinarily bright students and extremely good luck—for 3,000 hours I managed to avoid any type of damage to an airplane. At last, however, the lack of brakes got me. While taxiing out for take-off at a strange airport, I looked down the taxi strip. Everything looked smooth. Later, looking sleepily out of the right window, I saw a narrow gully immediately ahead. "BRAKES?" I bellowed, cutting the switch. But too late; the wheels settled comfortably into the gully and 40 dollars worth of prop flew up in splinters.

After the student returned to the field in another ship, my adventures really began. When the mechanic and I tried to fly the repropped ship back to the airport, a hollow, rapid rapping seemed to come from the engine. Twice we landed, cut the engine and the mechanic examined the engine carefully. I watched him with confidence until he muttered, "I oughta know better than to fly in these ships!"

At last we discovered the trouble: A too lean a mixture—No; a slipping prop—No; a tag end of safety belt hanging out of the door—Yes! In a rather stuffy silence we flew the offending airplane home.

But that wasn't all. This airplane had more tricks in store for me. Only a few weeks later I was elected to fly the little crate to Charlotte, N. C., with a commercial cross-country student. Arising at 5 A.M. I staggered out to my car. On the way to the field I paused briefly at a diner to try to introduce breakfast to my as yet unawakened stomach. With the last hunk of toast still stuck in my throat, I tottered out to the airplane. It looked tame enough, was gassed up and ready to go. Our cross-country took us from Washington, D. C., to Charlotte, N. C. We were to return before dark.

Everything proceeded smoothly. We lunched in Charlotte and on the return trip stopped at the Raleigh-Durham Airport for gas, only a little behind schedule. I had just about

(*Continued on page 50*)

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# Flying Cowboy

(*Continued from page 23*)

family is air-minded. This includes not only the charming and capable Mrs. A. who does a nice job at the controls on cross-country hops, but Autry's business representative "Mitch" Hamilburg, Producer "Mandy" Schaefer and all the lesser members of the group, some of whom are actually licensed pilots while others are merely confirmed air travelers.

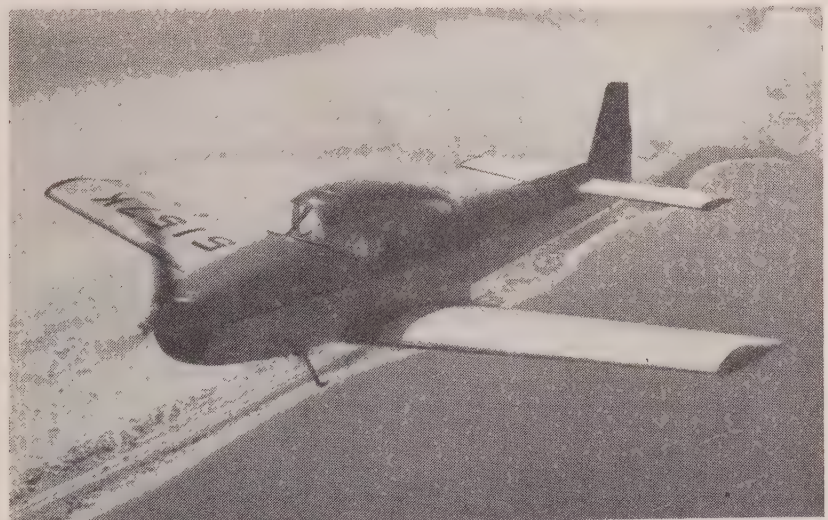
Recently Autry added a new member to his group to book tours. The fellow had never flown; in fact, just the thought of being up in the air made him dizzy. On his third week with the cowboy he received a hurry-up call from Herb Green. They had a week to set up some 20-odd towns Gene wanted to include in a winter tour. The landlubber sat it out during the first few days of flying. Then, up front with Herb, he gradually gained confidence in the Autry safe-and-sane policy. By the end of the trip he was a confirmed air traveler and, when Herb left him in Chicago, he had reservations on an airliner to fly back home to New York.

Operation of the Beech N80395 costs some $75 per hour, but to the busy cowboy his airplane is actually an economy. No airline schedule could possibly meet his personal and business requirements.

One of his recent three-day jaunts went like this: He left Hollywood Sunday night to be in Chicago for T-V conferences Monday morning. He spent Tuesday in his New York office, went on to Dallas to tend to some business on Wednesday, and was home in Hollywood to start a picture on Thursday morning, meanwhile having stopped off in Phoenix to check his radio-station operation.

Autry who heads two movie production companies (one for T-V and one for regular feature movies) figures his airplane saves many an item of production expense for him, too. Film shot on location several hundred miles from Hollywood can be flown back to the studio in a couple of hours on the night of shooting day. There it is processed and checked for possible defects and, if necessary, may be re-shot the next day, thus saving costly second trips to location sites as well as production delays. Too, skilled technicians, special effects people, cameramen, etc., fly to location sites with him and can confer and plan en route, again saving time and expense. For one-night stands, out-of-town benefits and miscellaneous personal appearances, Autry flies his musicians with him. One of his hit records of last Spring, "Funny Little Bunny," was composed by the cowboy with guitarist Johnny Bond during a Chicago to New York hop in the Autry Twin-Beech. The cowboy carries $100,000 liability insurance on each seat, plus full aircraft coverage.

N80395 carries no fancy theatrical identification on its fuselage. For that matter it's not tricked out inside, either. Only the plain white slipcovers on the backs of the seats carry the Autry signature, neatly hand embroidered by Mrs. A. Yet there's not a field in the country where the handsome Beech isn't recognized and given special welcome as it comes in for a landing. That's not because it's the ship of a celebrity but because field operators coast-to-coast know it belongs to a public figure whose sensible air operation has made him one of private aviation's best friends. Gene Autry is a real pilot's pilot and he's respected as such by all airmen.



The Ryan *Super 260 Navion* is coming off the assembly lines at San Diego, California. Pilot-appreciated feature of the new *Navion* is increased rate of climb and faster take-off. Other improvements are in cabin cooling, more luxurious interior styling, an exterior baggage door and a new all-metal Hartzell prop as standard equipment. Powered by 260-hp Lycoming, the new *Navion* cruises at 170 mph and has 1250 fpm rate of climb. This model gets its maximum cruise at 6,000 feet with prop turning 1765 rpm and the engine at 2750 rpm with 23 inches manifold pressure. With normal fuel load, *Super Navion's* range at full cruise speed is 415 miles; 595 miles at lower power setting.

# Flying Omnirange

(*Continued from page 37*)

The DME makes cross-bearings unnecessary for determining the plane's position. It permits the pilot to read on a dial his exact distance in miles from the omnirange to which he is tuned. He knows his bearing, of course, from the bearing selector on his receiver. The DME dial tells him continuously how far he is along that particular bearing. The DME works on radar principles, with a special transmitter on the aircraft "triggering" a transmitter at the omnirange site. The DME transmitter at the omnirange, in turn, sends a signal back to the aircraft. The time taken for the signal to make this circuit is electronically measured and translated into the number of miles shown on the dial.

The Course Line Computer, carried aboard the aircraft, is an electronic brain specializing in navigation problems. It permits a pilot to fly a straight-line course past an omnirange, instead of directly to or from it. Also, it makes it possible for several planes to fly safe parallel courses along the airways —an important consideration with the increasing congestion along our airways. The computer, continuously "listening" to omnirange and DME signals, translates them into right-left indications on the vertical receiver needle of the omnirange. This permits the executive-plane pilot to fly a course in any direction, even though there are no omniranges directly along the particular course he has selected.

The omnirange, DME, and Course Line Computer are some of the new equipment items which are being installed under an airways modernization program approved by military as well as civil aviation interests. The program, developed by the Radio Technical Commission for Aeronautics, will reach completion sometime in the mid-'60's.

*This article was taken from a booklet prepared by CAA to tell pilots how to use the omnirange.*

*Since more than 400 omniranges are being installed, there probably is one operating or under construction less than 50 miles from most communities. Information on local omnirange sites is available on request from the following CAA Regional Offices:*

*Region 1. New York International Airport, Jamaica, L. I., N. Y. (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont.)*

*Region 2. 84 Marietta St., N. W., Atlanta 3, Ga. (Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee.)*

*Region 3. Chicago-International Airport, Park Ridge, Ill. (Illinois, Indiana, Kentucky, Michigan, Minnesota, North Dakota, Ohio, Wisconsin.)*

*Region 4. P. O. Box 1689, Fort Worth 1, Texas. (Arkansas, Louisiana, New Mexico, Oklahoma, Texas.)*

*Region 5. City Hall Building, Kansas City 6, Mo. (Colorado, Iowa, Kansas, Missouri, Nebraska, South Dakota, Wyoming.)*

*Region 6. 5651 W. Manchester Ave., Los Angeles 45, Calif. (Arizona, California, Utah, Nevada.)*

*Region 7. P. O. Box 3224, Seattle 14, Washington. (Idaho, Montana, Oregon, Washington.)*

# Pilot Report . . . T-28

(*Continued from page 15*)

helmet, throat microphone, Mae West, backpack parachute and seat cushion, it's quite a climb.

"We may go out over the Pacific Ocean," said Ziegler as we got aboard, "and there's no use taking a chute unless you take the Mae West too. . . . And here's a release for you to sign before we go up."

We signed . . . and felt a little like a well-padded hockey goalie after all the accessories were strapped on and adjusted.

"If you want to see the T-28 from an Air Force instructor's viewpoint, climb into the back seat and I'll check you out on the cockpit installation."

The back pit was loaded! The instrument panel was full and extra gages, levers, knobs and dials spread out on both sides of the seat. At first glance, it looked like a four-fan transport, but there wasn't an instrument in sight that wouldn't come in handy. Even in our hour-and-a-half in the air, the maze of instruments became fairly easy to follow.

This cockpit arrangement has taken a lot of thought. Before the government even bought the original T-28 design, 22,240 man-hours went into the drawing boards. Reading from left to right are the engine accessory switches by the pilot's left elbow—cowl flaps, oil dilution, carburetor air and the emergency canopy release. The throttle quadrant contains the usual mixture control, propeller governor and a king-sized throttle with a large hand-grip on top that has two microphone buttons, one for intercom and one for radio. Trim tabs for all three controls are built-in just under the throttle quadrant.

The regular instrument panel is conventional but complete. Gages not found on lighter aircraft include a 360° artificial horizon, a radio compass and an accelerometer.

At the far right are the radio controls, including the radio compass receiver. The electrical system switches are naturally located near the radio and a novel master switch in the rear cockpit will over-ride any electrical switches operated by the "student" in the front cockpit.

The seat is adjustable and has an acrobatic shoulder harness. The release for tension on this shoulder harness is a little lever at the left of the seat while the conventional up-and-down release for the seat is on the right side. The seat has only one control and slides aft as it is pushed to the top. If you're long legged, you must use an extra cushion and drop the seat down a notch to keep your knees out of the instrument panel.

After this all-too-quick run-down of the gages and gadgets, Ziegler climbed into the front pit. We donned our cork-lined Lombard crash helmets (mine was borrowed from test pilot Joe Lynch) and plugged in the throat mike and earphone line. The ship is equipped with an oxygen system but the tanks were empty so we didn't bother to take masks.

Ziegler snapped on the switches and started the engine. With the canopy open, the T-28 is noisy. It has short exhaust stacks and the seven big cylinders (over 100-hp per cylinder) have a very sharp bark. Even with the protection of the crash helmet, the ship is still noisy until the canopy is closed. The seven-cylinder roar of this engine is different from the usual sound of a nine-cylinder powerplant and once heard is never forgotten. This engine is one half of the time-proved 14-cylinder powerplant used on the C-54 transport.

Mechanics pulled the external starter line and chocks before we taxied out. The normal tandem trainer is blind as a bat on the ground—not so the T-28! The pilot in the back seat can see amply well to taxi without S-ing.

"I'll go through the run-up and first take-off," advised Ziegler as we taxied out past the production line of F-86 *Sabres*. In the warm-up circle adjoining runway 25, he flipped the hydraulically-operated canopy lever to close the two sliding sections of the plexiglas dome. Instantly it was quiet. Then he went through the completely conventional pre-take-off procedure.

"Take-off power is 45 inches of manifold pressure at full 2600 rpm," said Ziegler as we lined up on the runway. "No flaps are needed."

He poured on the throttle and we were pushed back in our seats by the acceleration. We were in the air quickly. Factory specifications call for 722 feet of roll before leaving the ground and a rate of climb of over 2500 fpm.

We looked back over the tail as Ziegler throttled to 39 inches and 2400 rpm. The field was far below us and the T-28 was boring into the blue at a surprisingly high angle of climb.

"It's all yours," said Ziegler over the intercom. "Take it wherever you want and do whatever you feel like." He wiggled the stick briskly and then put his hands up in plain sight on the top of the front instrument panel.

The control touch was remarkably light for such a large airplane as we started a climb upstairs in really clear air over Los Angeles. The trim tabs are placed just right so that your left hand drops on them quite naturally. There's plenty of torque in a 125-mph climb if you don't trim it out.

We headed east, away from the populated area of Los Angeles, and climbed to 10,000 feet in a series of shallow 90° turns. At 10,000, we leveled off and tried to pick up the feel of the T-28 with a series of medium and steep turns with a quick roll-in and roll-out. The ship takes a lot of rudder pressure when rolling into a fast turn but the whole control balance is excellent.

Next came stalls. With a wing loading of nearly 24 pounds per square foot, a fast-breaking stall might have been expected—but not from the T-28. When this ship stalls, it does everything but light up and say "tilt"

(*Continued on page 42*)

## WING TIP

Here's a handy tie-down for visiting pilots. A heavy steel cable run continuously along the ground provides a ready tie-down for itinerant pilots who only want to leave their planes for a short while. The cable tie-down consists of two heavy-duty steel cables, running parallel to each other and spaced for tie-down of the average small plane: one cable is for the wing struts, the other for the tail. Cables are anchored every 10 feet.—*B. Blatt.*

# Godfrey's Executive Transport

(*Continued from page 12*)

A compact galley aft of the pilots' compartment is equipped with Helmco hot cups, and Mapco liquid containers and hot food oven. Also aft of the pilots' compartment is a plush washroom which even has an electric razor.

In spite of all this luxury, which is bound to increase the empty weight of the ship, the N1M will accommodate 14 passengers with a possible payload of 6,445 pounds. Frank La Vigna tells me they have never yet come anywhere close to the full allowable gross weight.

After the richness of the cabin, I was prepared to be a little disappointed in the cockpit. I was not. It is a good workmanlike cockpit, leather-upholstered, and equipped with dual flight instruments, one set Bendix electric and the other Sperry vacuum type. I would have preferred a slightly different grouping of the instruments, but of course that is a matter of personal preference and also of what you have become accustomed to.

I was particularly impressed by the indirect lighting on the instruments. This is done by inward-beveled openings from peanut bulbs placed behind the panel. I didn't have the opportunity to observe the lighting under actual night-flying conditions but it appears to be the most effectual system I have ever seen.

Frank started the Wright engines up while I looked around for a set of earphones. There are none. Godfrey's DC-3 is equipped with loudspeaker-type communication receivers. Most of you have probably had some experience with those. Personally, I am used to wearing a headset and to me the ground station transmissions come through much more readable that way.

The tower gave us runway 24 and we got into the air nicely in about 1300 feet. Frank pulled 2500 rpm and 45 inches of manifold pressure which gave us 1200 horses apiece on the engines. Incidentally, the tachometer is equipped with a synchroscope so you don't have to clap your ears to the engines to get the props turning at the same speed.

We throttled back to cruising at 1500 feet and Frank turned on the Lear autopilot. It's a mighty sweet little piece of equipment. Furnished with a pitch knob and a controller, it will make coordinated turns up to 40° bank and pitch changes up to 20° up or down. These limits, of course, can be adjusted to suit. There's an altitude control that works as smoothly as a Southern drawl; none of this porpoising that's so aggravating on a long flight. We made 30° banked turns in both directions without losing or gaining more than 10 feet.

Nowadays it isn't enough to just get there. You have to be able to "let down through" once you're over. The Lear autopilot on Godfrey's plane has an approach coupler. This means that if you feel tired or cross or something, it will fly an ILS approach for you, hands off. We tried one and pulled up at 100 feet right along the runway centerline.

The N1M has two of these Collins ILS receivers on board so that the proper operation of each can be monitored by the other. Most of us are familiar with the conventional ILS indicator. It consists of a cross-pointer meter, the vertical needle of which indicates the degree of aircraft displacement from a flight path leading to the runway. The horizontal needle indicates the degree of displacement from a glide path designed to place the aircraft in a position to touch down in the first third of the runway. When both needles remain centered, the aircraft is traveling along a path which will enable the pilot to make a normal landing upon breaking out of the overcast.

One of the ILS receivers is equipped to fly the new omniranges. Instead of flying one of four possible on-course signals as in conventional radio-range flying, the pilot can select any one of 360 range legs merely by setting the desired course in the instrument window. Navigationally, the result is the same as having an infinite number of railroad tracks each leading straight smack-dab into the station. When the ILS vertical needle is centered, the aircraft is on the desired track line with reference to the station. An additional indicator tells you whether you are headed TO or FROM the station.

It was during the approach that I first noticed the Sperry Zero Reader. It was anticipating the ILS signals. The vertical needle on the Reader would say "Fly right" and a few seconds later the ILS indicator would say "You are left of track"; or the Reader's horizontal needle would say "Fly down" and a few seconds later the ILS would say "You are above the glide path."

(*Continued on page 43*)


AVIATION

ESSENTIAL

in peace or war

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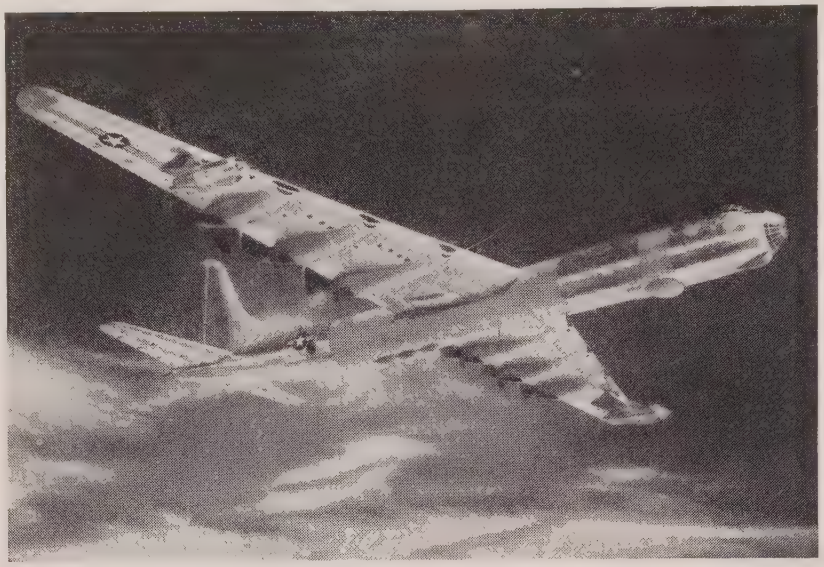

## Fact-Finding Weapon

This aerial photo of the Convair RB-36D reconnaissance bomber is the first flight view released on the Air Force's intercontinental fact-finding weapon. The jet-augmented RB-36, equipped with the most powerful cameras ever installed in an airplane, was designed to serve as airborne eyes and ears for the Strategic Air Command. Its missions will be to seek out and bring back the facts on enemy targets, no matter how well-hidden, guarded or isolated those targets may be. Like the B-36 strategic bomber, the RB-36 operates in the stratosphere at speeds of more than 435 mph. The RB-36D is in production at the Fort Worth plant of Consolidated Vultee, where earlier models of the B-36 are being converted into long-range reconnaissance bombers. Maximum speed of the RB-36D is given as "over 435 mph."

# Pilot Report . . . T-28

(*Continued from page 40*)

before it quits flying. Stalling speed is 72 mph with the gear and flaps up and there is a strong shudder long before the airplane quits. With the throttle off, the landing gear warning horn blared audibly even through the thick crash helmet.

In the old CPT days of 1939—and even before—flight instructors had what was called a "rudder exercise stall." The maneuver calls for full back stick to a complete stall, holding the wings level with rudder alone. The exercise works out well in lightplanes, but it is usually quite violent in a heavier ship. The T-28 does a nice, docile full-back-stick stall for just as long as you want to hold it there. It has good aileron control even at the stall point.

Next came stalls out of turns and accelerated stalls. We pulled into a tight gliding turn and hauled back on the stick. The ship shuddered after a while, finally stalled and rolled itself level. In an accelerated stall, we rolled over into an almost vertical turn, reefed back on the stick quickly to force the ship into a stall—and waited. The same warning shudder was there and the ship popped up out of our vertical turn as soon as the controls were stalled out. There's no excuse for an unintentional stall in this ship.

"How about a slow roll?" we asked.

"Go ahead. Do anything you want," nodded Ziegler.

It had been over six years since this writer had done any acrobatics and then they were flown while instructing from the front pit of a PT-17 Stearman. So it wasn't unexpected when the slow-rolls didn't come out right on-the-money.

We made a couple of 90° turns to make sure there was no one else around, lined up on Mt. Baldy and went into a shallow dive to pick up a little extra speed. Then the nose came up and we eased in full left aileron. The T-28 went around smoothly and a pencil slipped up out of our flying suit pocket as we were upside-down. It hit the clear canopy and slid around the curved surface lazily as the ship rolled rightside-up. In the inverted position, the nose naturally began to drop and we lifted it up with a little too much forward pressure on the stick. Control balance is excellent.

"A snap roll?" we asked.

"Go ahead. But keep your entry speed below 150 mph," replied the project test pilot.

After another clearing turn, we lined up again on the mountain. After the T-28 had lost a little speed, we eased clear back on the stick and fed in full right rudder. The ship snapped fast, as most heavy airplanes will do. As the T-28 cart-wheeled past the inverted position, we followed the old Stearman technique and applied full opposite rudder. That was too soon—and in spite of the tight shoulder harness, the force of the rudder slammed us up against the left side of the cockpit and the hard crash helmet bounced off the plexiglas. That night this writer carried around a very stiff neck.

Ziegler turned around and grinned.

"It's been a long time . . . ," we alibied. "How about a loop?"

"Sure. You're flying the airplane. Have at least an Indicated 250 when you start your pull-up—3 G's will get the T-28 around easy," said Ziegler.

After a clearing turn, we rolled the big trainer over into a steep diving turn toward the orange groves below. The speed picked up quickly to 200 . . . 225 . . . 250, and then we kept the nose down for a second more just for good luck. At about 270 Indicated, we planted our number 12's firmly on the rudder pedals and started back slowly on the stick. The nose came up, and up and up. We poured on full throttle and looked up and back to watch for the horizon. There wasn't anything in sight but blue sky. A quick glance showed the airspeed dropping to 130 and we came back a little faster on the stick. Yup. There was Mt. Baldy at last. The throttle came closed as we dropped down out of a loop that must have been a half-mile across. The pull-out picked up a lot of speed and I began to "grey out" across the bottom of the loop from the continuous application of 3 to 4 G's.

"This'd make a fine 'hot-rock's' airplane," I said into the throat mike.

Ziegler nodded. "It'll take anything you want to do—and a whole lot more."

"That about does it except for spins," I said.

"Better go on up to 15,000 before you try them. This is a heavy airplane and it goes downstairs in a hurry," said the factory pilot

Even above 10,000 feet, the rate of climb was fast. No wonder there's oxygen equipment in the T-28. The spins themselves were very docile. The shipped dropped out of a stall into a smooth rotation as soon as you applied rudder. We recovered after a turn and a half with the regular full-opposite-rudder-and-full-forward-stick technique. Even in the hands of a pilot on his first T-28 hop, the ship came out of its spins very easily although I nearly put it over on its back by holding forward stick too long after the rotation stopped.

Heading back toward the International Airport, we slid the rear seat clear to the bottom to get the feel of the T-28 on instruments. Cruising speed is 190 mph on 55 per cent of power with a top speed of 288. The radio compass was tuned on the Los Angeles range station and we "bird-dogged" back toward the factory. As we approached the station, we cut back on the power and let down at 1,000 fpm.

"I'll take it in for the first landing," said Ziegler as we came in over the busy International Airport. "Follow through on the controls and then take it around yourself."

Ziegler called the tower, turned in over the field and slowed to 140 before dropping the landing gear. The gear-down handle is a wheel-shaped unit sticking out from the left side of the instrument panel. Pull down and the gear goes down—push up and gear goes up. Three small indicator cards show whether the gear is up, down or unsafe and the horn on the throttle gives a double check.

The big flaps dropped to 15° on the downwind leg. The flap control is just aft of the throttle and is shaped like a flap cross-

(*Continued on page 44*)

# Godfrey's Transport

(*Continued from page 41*)

That Sperry Zero Reader is real aviation news. Frank told me it needed calibrating but it looked like hot stuff to me just the way it was. To begin with, it can be used as a flight instrument. We set a few headings on the Heading Selector and it rolled us out "on heading and level" just as neat as a double cognac. Frank invited me to go along with him for the calibration ceremonies at Sperry's and that's where I really got the word on the Zero Reader.

We arrived at MacArthur Field, Long Island, early in the afternoon. What with all the approach gadgets on board, I had been hoping for a little weather or at least a low ceiling but we were able to get in VFR.

Bob Roe, Sperry chief test pilot, and Tom Cooley, field engineer, were slated to go up with us. While Tom gave the equipment a ground check, Bob and Frank and I shot the breeze about the Zero Reader.

It's an entirely new approach to instrument flying. Radio range audio courses, localizer flight paths, even QDM approaches on radio beacons all tell the pilot the position of his aircraft with reference to the desired track. This means the pilot must have a certain amount of experience with the particular aid he is using so that he can interpret his actual distance off track from the instrument indication. The Zero Reader does not tell you where the airplane is, it just tells you which way to move the wheel. The vertical needle on the Zero Reader takes bank signals from the gyro, heading signals from the Sperry Gyrosen compass, and track signals from the Localizer. It adds all these together and comes out with a signal that will make the airplane go exactly where you want it to go. The horizontal needle takes pitch signals from the gyro and glide slope signals from the Glide Path. It adds them together and comes out with a signal that will carry the aircraft straight down the glide path. You do not have to lead the indications as you do with conventional approach instruments. All you have to do is keep both needles centered on the dial. It is actually an automatic approach but it uses the pilot's muscles for servo units.

The fact that the Zero Reader does not tell you the position of the aircraft is a limitation, of course. The pilot must still glance at his conventional instruments to determine the attitude of his ship and its position relative to the on-course. The purpose of the Zero Reader is to make the pilot's job smoother and easier so that he has more freedom to monitor all the other conditions pertinent to flight safety.

When Tom had finished his ground check, Frank La Vigna and Bob Roe climbed into the cockpit seats and we taxied out. Frank made the take-off and we leveled off at 1,000 feet, the initial approach altitude for the MacArthur ILS. While Bob watched the indicator, Tom Colley turned the sensitivity screws until they were fixed at the proper setting. Then they adjusted the instrument to give the desired cut at the beam, in this case 40° to 45°, and we were in business. All this kidoodling actually took almost as little time to do as it does to tell about it.

Bob Roe started Frank out with a few simple turns and altitude changes, demonstrating how the Reader's Heading Selector and Altitude Control would bring him smoothly back to heading and altitude. Then they added the Localizer and Glide Path signals and really got down to business. I watched while Frank La Vigna made several practice approaches. All he did was zero the indicator each time it left center and occasionally place a new setting on the Heading Selector. All the airplane did was come straight down the runway every time, right on the money.

On the way back to Teterboro I asked Frank what changes Remmert-Werner had made to accommodate what seemed to me to be a fairly heavy electrical load. I learned that the original 12-volt DC system has been upped to 24 volts. Circuit protection is handled by a breaker panel instead of the conventional fuse box. The advantage of this is greater ease in re-establishing contacts. It is one thing to reach out and push a circuit breaker button and quite another to crawl about replacing fuses, especially if you happen to be minus the particular fuse you need. Exide batteries are used.

There are six 100-volt 400-cycle inverters to furnish AC power for the electrical instruments, ADF's, television and fluorescent cabin lighting. Only three of these are in normal use so Godfrey is well equipped with spare inverters. An interesting and useful addition to the AC system is a Bendix failure warning device for the flight instrument inverter. Instead of following faulty instrument indications until the aircraft is performing a split S or some such odd maneuver, the pilot is immediately warned of inoperative instruments by a yellow window on the panel.

Along the line of warning devices, Godfrey has made extensive safeguards against aviation's greatest hazard, fire in flight. An Edison fire warning system is incorporated into the N1M. Red lights on the copilot's instrument panel indicate on an aircraft diagram the location of a possible fire. Nose and tail sections of the fuselage as well as the power section and the accessory section of each engine are equipped with the Edison detectors which are actuated by excessive heat. In the line of prevention, Skydrol, a fire-resistant hydraulic fluid developed by Monsanto Chemical Company, is used and all fabric surfaces are finished with fire-resistant Skylac, also a product of the Monsanto Chemical Company.

Back at Teterboro, we called the tower for landing clearance and Frank showed me the air-to-ground communication hook-up. The airplane is equipped with a Wilcox VHF transceiver and a Collins MHF transceiver. Both these sets are the channelling type so there's no time-consuming tuning in required. Just the flick of a switch and the desired frequency is automatically selected.

After we had landed and buttoned it up, I asked Frank what he thought of the conversion job as a whole. He said, "I think it's probably the best equipped DC-3 in the country—and Remmert-Werner did a swell job." I can't help but agree with him.

### How much gasoline?

*The 21,116 gallons of gasoline that's contained in a big U. S. bomber's wing tanks would send an automobile around the globe 16 times . . . and still leave enough gas for a tour of the States.*

*Courtesy AIA's "Planes"*


*This Young Man took a few minutes out...to think about his FUTURE CAREER. Why don't YOU?*

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HIGH SCHOOL ATTENDED Graduated: Yes ☐ No ☐

S-12 Check one: ☐ Veteran ☐ Non-Veteran

# Pilot Report . . . T-28

(*Continued from page 42*)

section to avoid confusion. Ziegler turned in toward the runway from a high 1,000-foot base leg and hit full (38°) flaps. Airspeed was 120 mph and the ship really started down. We crossed the fence at an even 100 and touched down a little under 80 mph.

"You've got it," said Ziegler as he waggled the stick.

We taxied back and tried out the steerable nose wheel that operates when you depress a lever on the front of the control stick. At the end of the runway we parked, re-set the trim tabs and ran-up the engine. The parking brakes operate only in the front pit since the ship is designed for solo flight just from the front. Ziegler had to set the brakes during the run-up.

All the gages seemed in the green so we pulled into take-off position after a nod from the tower. The big throttle handle takes a good honest push to pour on the power. We were almost off the ground by the time the manifold needle hit 45 inches.

With its wide landing gear and steerable nose wheel, there's no problem in keeping the T-28 right down the middle of the runway. As it breaks ground, the ship pulls up into a steep climb—at least it looks plenty steep when you're accustomed to flying light airplanes. That 800-hp takes you upstairs right now.

We pulled up on the gear handle and the wheels snapped up quickly. The throttle and prop controls came back and by then it was time to turn in the pattern.

An F-86 streaked by as we rolled out on the downwind leg and dropped the gear. We pushed the prop forward to 2400 and started to turn in on the base leg when the control tower called, "T-28 turning base . . . extend your downwind leg to clear a C-47 on a landing roll-out on two-five-left."

From the air it looked as though we'd fly clear to Inglewood and back before the transport turned around at the far end of the runway and taxied back to the first turn-off. I hit the gear-up lever and circled the field again.

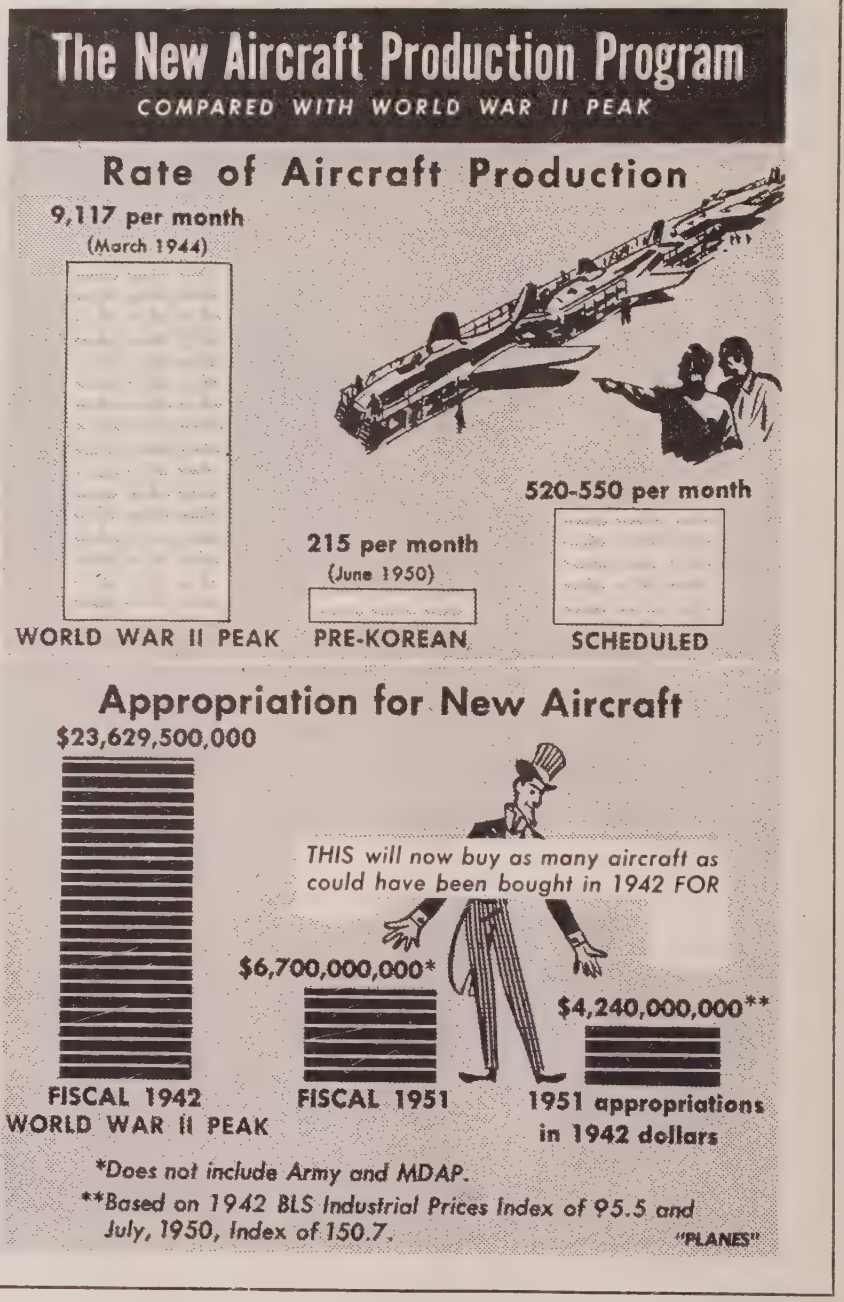
This time the runway was clear. Gear down . . . Then call the tower . . . 1/3 flaps on the downwind leg and slow to about 120 mph . . . Then turn on the base leg (check the skid ball out of the corner of your eye) and roll in toward the runway. . . . We waited a little too long at this two-mile-a-minute speed and had to "S" back to line up with the runway on the final approach. . . . Full flaps and slow to 100 across the fence. . . . These heavier ships settle so smoothly. . . . Now hold it off easily and let it touch down. It's easy to land a T-28—even out of the back seat—because you can see so well.

We taxied into the line and parked the ship after an hour and a half in the air that seemed like only 30 minutes.

The new T-28 is a fine trainer—and it'll keep the grey out of the flight instructor's hair. If the instructor is happy with the visibility and flight characteristics of his plane, it's a cinch he'll do a good, fast job of teaching.

"Give me a green student and let me fly him 100 hours in the T-28 and he'll be ready to solo that F-86," said Ziegler.

He should know. He flies them both.




# Sell to the Air Force

(*Continued from page 17*)

of Orange, Ulster, Greene and Columbia counties. (*See list and map.*)

On the West Coast you would deal with the Los Angeles field office. These offices do not procure, but they do administer contracts and act as clearing houses for Air Force procurement information. All the catalogs of classes and sub-classes of items bought by the Air Force are available at each of these offices, as are bid sets on current advertised procurement, abstracts of bids after contract awards, etc. In general, they are the same services as can be obtained at Procurement Division Headquarters, Wright-Patterson AFB in Dayton, Ohio.

Certain electronic devices are purchased through the Watson Laboratories. This company is scheduled to move from Red Bank, N. J. to Rome Air Force Base, N. Y.

Local purchases of "housekeeping" items are made by the Purchasing and Contracting Officer at each Air Force Base. These items include a wide variety of hardware, office supplies and similar commodities.

Petroleum, oil and lubricants are purchased jointly for the Air Force, Army and Navy by the Armed Services Petroleum Purchasing Agency, Room 11009, Bldg T4, Washington 25, D. C.

Finally, all medical supplies are purchased by the Armed Services Medical Procurement Office, 84 Sands Street, Brooklyn 1, N. Y.

Apart from the items in the above three paragraphs, all Air Force procurement is at Wright Field. The Director of Procurement and Industrial Planning is Maj. Gen. Orval R. Cook. His opposite number on the Air Staff at the Pentagon is Brig. Gen. H. A. Shepard, who up to a few months ago had the job now run by Cook. Top policy, Congressional testimony, Joint Chiefs of Staff liaison, etc., are in general the functions of

the Air Staff group, while execution and actual operations are carried out at Wright Field.

Lt. Col. Green gave me a brief outline as to how a firm can get on the Air Force "bidders list." First of all, for those who want to start at Wright Field (and between 200 and 250 per day are currently making this pilgrimage) a Contractors Relations Office was set up in 1948 in the conveniently located Bldg. 15 at Wright Field, Dayton, Ohio, by Brig. Gen. Shepard. At this office visiting businessmen are sorted out and appointments made with the proper buyers, engineers and others in one of the three main buying sections at AMC: Aircraft & Missiles Section, Aeronautical Equipment Section, and Research & Material Section.

If you are not sure what your firm can best do in the vast program, you will be sent to the Source Unit where you can glance through some of the 28 different catalogs of major classes of equipment bought by the USAF. In all, some 580,300 different items are listed, each with a serial number. After looking over the set of catalogs you have selected, circle the serial numbers of the items you can turn out in your shop. Bring or mail back the catalogs with the circled numbers to Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio, Attention MCPPXS72, with your firm name and address filled in at the front. (You can save the trip to Wright Field by writing to the above address and asking for an *Index* of USAF Catalogs of Items; or visiting your nearest Air Force Procurement Field Office and going through the same procedure.)

Anyway, in one way or another you have circled your items and sent back the catalogs. From these, punch cards are made up and filed away under the various classifications; there are more than a million and a half such cards on file.

Whenever the Air Force wants to buy a quantity of some particular item, an IBM machine throws out all the cards for that number and a list of the names and addresses of the interested firms is made up.

You will get an Invitation for Bid card stating that the Air Force wants to invite bids on this item, together with a brief of specs, quantity, delivery date, etc. You mark X in the space provided if you are interested in receiving the "bid set," in which case this will be sent as soon as all the cards are in and a sufficient number made up. If you are *not* interested in bidding for this item but want to stay on the bid list, mark X in another space and return card within the specified time; otherwise you are automatically dropped, and have to start all over again!

If you decide to bid, you should study the bid forms carefully. They supply drawings, specifications, shipping instructions and similar data. The advantage of being on the list is that it permits a full 20 to 30 days in which to prepare bid figures prior to the date the bids will be opened, which is done publicly by a representative of the Procurement Division.

Remember that the official policy is that no company is too small to do business with the government. Remember, also, that your bid, if accepted becomes a binding contract, and you must see it through.

This is the procedure for run-of-the-mill items on which formal advertisements are issued. There is another list, however, known as the Qualified Products List, on which several hundred items are found. These are items which must be tested and performance established before procurement. If your firm wants to sell such products, samples for test should be submitted, and if they meet Air Force specs, these items will be eligible to win a contract.

At the present time there is an even more promising field for the small manufacturer than either of the above two which involve prime contracts. This is the field of subcontracting. Advice and counsel is available both through the Contractors Relations Office or the Procurement Field Offices.

Designation of subcontractors is the exclusive right of the prime contractor; you must contact him to get the business. Definite instructions have gone out to the prime contractors that they must use up all available tooling and plant space by subcontracting before the Air Force will even consider expanding prime facilities. Subcontractors lists are supplied to prime contractors from Air Force lists of approved facilities.

At the present stage of the procurement program, the small-business man can get better dividends from the money he would spend for a trip to Wright Field by contacting the plants of Air Force prime contractors in his own area and making his availability as a subcontractor known. If he is a newcomer, large or small, this subcontracting picture should be explored very thoroughly before the major prime contractors make their commitments.

The Air Force very definitely encourages this. It is also in line with official Department of Defense policy. For those who are located in its general vicinity or who for other reasons still prefer to "start in Washington," the Defense Department has set up a Central Military Procurement Information Office in Room 3D760 of the Pentagon. This is part of the Small Business Office of the Munitions Board.

The important thing is to learn the simple and definite procedure set up for Air Force procurement, and follow it in detail. "Influence" (either a "five-percenter" or any other) is completely out of the picture, and if attempted to be used (there are still plenty of them around!) might do more harm than good. The Government has gone all out to make it easy to sell your products in a straightforward way.

For Air Force matters you can see Maj. Bernice C. Phillips (WAF) who, as I found out, has all this stuff at her fingertips, and is prepared to discuss problems and then direct you to proper purchasing agencies for your particular products. Major Phillips said the CMP Information Office is answering better than 1,000 letters per week and handles scores of interviews daily. Hundreds of copies of the yellow pamphlet with the "Follow Me" jeep on the cover entitled "*A Guide for Selling to the Air Force*," are being given out every week.

Get a copy of this booklet if you want more detailed information, and the best of luck in your efforts to sell something to the Air Force.

AIR FORCE PROCUREMENT FIELD OFFICES

*New York Air Force Procurement Field Office, 67 Broad Street, New York 4, New York; telephone, Whitehall 4-1600.*

*Dayton Air Force Procurement Field Office, Wright-Patterson Air Force Base, Dayton, Ohio; telephone, Kenmore 7111, Ext. 6-5306.*

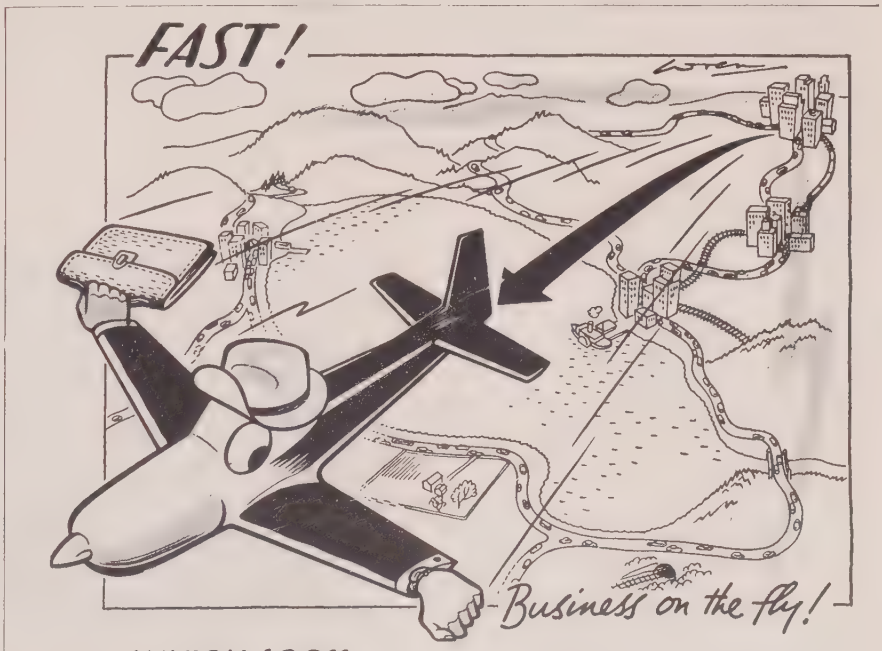
*Boston Air Force Procurement Field Office, Boston Army Base, Boston 10, Mass.; telephone, Liberty 26000.*

*Detroit Air Force Procurement Field Office, West Warren and Lonyo Avenues, Detroit 32, Mich.; telephone, Hogarth 9730.*

*Fort Worth Air Force Procurement Field Office, Government Aircraft Plant No. 4, Fort Worth 1, Tex.; telephone, 7-2181.*

*Los Angeles Air Force Procurement Field Office, 155 West Washington Boulevard, P. O. Box 3849, Terminal Annex, Los Angeles, Calif.; telephone, Prospect 4711.*

*Chicago Air Force Procurement Field Office, 209 West Jackson Blvd., Chicago 6, Ill.; telephone, Webster 94384.*


The NAVION LOOK by Loren. *Navions* are fast...airliner fast...three times faster than surface travel. The Super 260 cruises at 170 mph...the DeLuxe 205 at 155 mph.

# News Photo Below

(*Continued from page 19*)

landing speed in case of a forced landing and you can't beat the *Cub*. It's usually cheaper, too.

On one routine assignment, I was shooting a series of new buildings under construction in downtown Pasadena. The pilot and I made an unscheduled landing on the golf course adjoining the famous Rose Bowl. The magneto points on the old 40-hp. engine had fouled out. We landed on a broad fairway without any trouble. In a larger, faster airplane, a forced landing of this type would have been quite a problem.

If the news story is more than 50 miles away, the *Cub* won't do as good a job as a faster ship because of the time element. Any fast airplane is okay, but I prefer a high-winged monoplane like the big Cessna 195. The front windows will roll down and you have unrestricted visibility from the right front seat. In low-winged planes like the *Bonanza* or *Navion*, the pilot has to rack the ship up in a tight turn to get the wing out of the way unless you pull off your shot as you come in on the picture. These ships have the added disadvantage of having plexiglas panels that will not open easily in flight. When you're forced to shoot through plexiglas, you can't be sure of your shots unless the camera is completely in the shade.

Not so long ago a Santa Fe passenger streamliner hit a broken rail near Azusa. It was on a Sunday afternoon and all our staff was off duty. Through our various news sources, three of our photographers turned up on the scene while the diesel engine was still smouldering. As soon as the second cameraman arrived, he was sent to the nearest airport. Since the only way to show the wide-spread destruction in a single picture was from the air, we used an aerial photo on page one and a full page of ground shots on an inside picture page.

Some papers make their air pictures with specially shielded cameras or expensive custom-built aerial equipment. The main difficulty with this set-up is that you never have the special cameras where you want them—they're always in the office. Every news photographer worthy of the name always carries "his box" (a 4x5 Speed Graphic) and a set of film holders knocking around in the back of his car. To leave the camera at the office is just like going out without your pants.

For special assignment pre-arranged air coverage, we have a 5x7 surplus F-8 aerial camera, but it's hard to tell the difference between prints from this big bertha and those made with the Graphics. The one advantage of the 5x7 rig is that you don't have to fly so close to your object.

How to fly a photographer—and keep your license—is almost a story in itself. In the past 12 years that we have been carrying frequent air photos, there has never been a complaint to the CAA or the Sheriff's Aero Squadron on our low flying—and sometimes we have been quite low. The charter pilots who normally fly our camermen have tricks of the trade to keep themselves out of trouble. I never ask a pilot to go down to any specific altitude, but I usually ask him to go in as close as he feels safe. One day I was photographing a hospital in the downtown area, and a new pilot was at the controls. I asked for a close-in picture and when the building began to loom too large in the camera finder, I told him to level off.

"Shucks, I thought you wanted to go in low," he drawled later. Then I found out that he'd spent the past two years crop dusting!

If he'll make shallow turns, keep his throttle operation smooth, not make more than two passes over any one area and fly in a manner that generally won't invite attention, any pilot can come down to at least the legal minimums in a lightplane without having anyone call his NC number to the Sheriff.

Accident stories that cover considerable area on the ground are ideal for air coverage. When an oil tanker caught fire and burned all night at a San Pedro pier, wharfs on both sides of the harbor were destroyed. The best way to tell this day-after-day story to our readers, and the only way to get the story all in one picture, was from the air. This set-up was ideal from the pilot's standpoint because there was nothing nearby but oil refineries—and plenty of open area for forced landings. The resulting picture of fire boats and dryland fire fighters pumping water into the blackened hull that had already split in two made a good-sized cut on page one.

A top news story in Southern California for the past few years has been the eye-irritating wall of "smog" (smoke and fog) that has blighted the area. How are you going to tell this story from the ground? The grimy haze looks like a fogged negative from the street level, but take a plane up on-top of the "smog" and knock off a set of pictures with blue sky at 5,000 feet and smoky haze below, and it tells the story.

There are always those stories that turn out to be duds. One day we flew all around Mt. Baldy hunting for a non-existent forest fire. Another time we cruised nearly 150 miles out to Indio chasing a desert cloudburst and flood that didn't materialize. When an airliner was missing after a thunderstorm, the news camera went along in search planes whenever a tip filtered into the office that wreckage had been sighted. Another unproductive flight resulted after the wire services carried a story that a pleasure fishing boat had capsized off Malibu Beach, but we couldn't find any hull.

Not all air assignments are front-page headliners. The day-by-day routine of news coverage frequently calls for an air picture. A new city park, subdivision, boulevard or progress photo of buildings under construction is always newsworthy. The first snow fall of winter on nearby mountain peaks is timely and the crowds in Pasadena to attend the annual New Years' parade and Rose Bowl game are suitable subjects for top-side coverage. When census figures were announced, we carried comparative air photos of suburban towns with pictures of what they looked like 10 years ago.

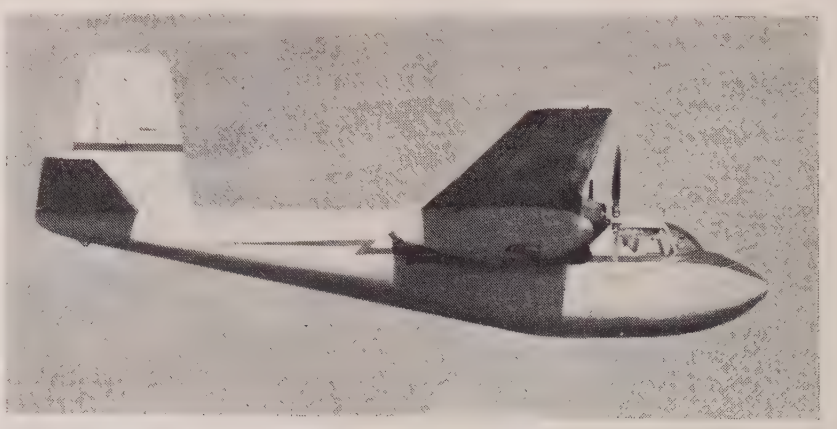
In the ever-congested Southern California area, air photos graphically illustrate the concentration of motor vehicles at peak traffic hours. A series of ground photos will tell part of this same story, but one big air print gets the whole idea across. Actually, the Los Angeles area is becoming so crowded that there's hardly a place left in which to land a *Cub*.

There's no reason to wear a parachute in a small plane because you're usually too low to use one anyway. In larger ships where you are shooting through an open door or on the high-altitude assignments we used to make before the war, I like a 'chute. In an open cockpit, it's must easier to move around without the restriction of the safety belt. While I've never lost any equipment overboard—yet—all our cameras are insured against air loss.

I usually plant my boot on the strut of a *Cub* and rest my camera on my knee when I'm in the back pit shooting forward. The flesh of your body will absorb any motor vibration. For days with good light, my standard exposure is 1/500th of a second at f.11 with fast press film.

Personally, I always look forward to covering a big story from the air. There aren't a thousand spectators and a handful of police officers pushing you around. You don't have to drive like mad to get to the assignment and back—though I'll go along with the pilots who say "the ride out to the airport is the most dangerous part of flying."

When the phone rings in the morning anytime before our noon deadline, there's always the possibility of a big story. And on nearly every big story, one of us goes flying for a bird's-eye view of today's news today. Where any large area is involved, there's no better way to cover that story—for my money—than from the back pit of a low-flying *Cub*.



**AERO COMMANDER** recently was awarded its type certificate by Civil Aeronautics Administration. Deliveries of this five-to-seven-place plane will begin mid '51.

# Triple Threaters

(*Continued from page 25*)

far faster and far higher than anything we had in World War II.

These are the airplanes of the Atomic Age —these and others even better which are still on the drawing boards or undergoing their first tests in experimental prototype. And the triple-threaters are the men whose function it will be, should we ever have complete war forced upon us again, to guide these planes to the land of the enemy and drop their cargoes of atomic and perhaps even hydrogen bombs.

It's the mid-century version of a story as old as aviation itself. It's the story, repeated over and again, of new equipment creating the need for new skills.

Right up to the end of World War II, and for a short time afterward, the Air Force had no need for triple-threaters. One man could perform as navigator, another as bombardier and a third as radar operator. But this leisurely way of doing things was rendered obsolete by the trans-sonic speeds and the stratospheric altitudes of the new bombers of the Strategic Air Command.

The reason is easily apparent: At such speeds and altitudes there is no time for coordination of navigator, bombardier and radar man. Modern bombers flash over their targets in the fleetest fraction of a second. From their great heights the targets are often obscured by cloud layers, and accuracy is imperiled by winds up to 130 mph. By the time the navigator communicated with the bombardier and bombardier cleared with radarman, the target would be past and opportunity gone.

How complex the problem of target identification has become in the Atomic Age may be deduced from these dramatic comparisons which were emphasized during the week in which I talked and flew with Uncle Sam's triple-threaters at Mather:

During World War I the average five-minute bomb run was made at 10,000 feet, starting 7¼ nautical miles from the release point. During World War II, the five-minute run was made at 20,000 feet, starting 14½ nautical miles from release. Today, the same five-minute run is made at 40,000 feet, starting 36 miles from release.

And the man in command from the moment the bomb run begins is the navigator-bombardier-radar operator.

It would seem no exaggeration, then, that the Air Force's Bombardment School at Mather, which turns out nearly 600 triple-threaters a year for the Strategic Air Command, has adopted this as its motto: "No matter how many pilots or how good the planes, the USAF is no better than Mather's product."

The commanding general of Mather Air Force Base, tall and quietspoken Brig. Gen. Carl B. McDaniel, puts it in these succinct terms: "There is little sense in sending a plane into the air if it doesn't know how to get to the target or can't hit the target with its bombs when it gets there."

Radar—the strange and wondrous sorcery of electrical impulses bounding against an object and back again—is the prime tool of the triple-threater's trade. He navigates with radar, through trackless space, day or night, in clear, azure calm or through fog and the storm's mighty tumult. He bombs with radar, searching out a pinpoint on the earth's sphere from more than a half-dozen miles up in the sky, in light or darkness and no matter what the weather. With radar, he spots hostile aircraft around him and sorts out military targets from non-military objects in the confusing hodgepodge of a city far below.

Radar serves the triple-threater in several different roles, the most important of which is in the bulky and incredibly intricate machine known as the "APQ 23."

Here two scientific triumphs have been merged into one, for the APQ 23 combines a mechanical computer with radar. The computer, weighing 1,000 pounds by itself and equipped with 100 different tubes, takes the place of the old wartime Norden bombsight.

Approaching his bomb run, the triple-threater sets a miscellany of data into his APQ 23—drift, altitude, winds, etc. Radar picks up and holds the target for him. Then, during the bomb run proper, control of the plane passes back to him. Actually the ship is flying on automatic pilot which in turn is hooked into the APQ 23. When the ship reaches its target, the bombs are dropped automatically.

It was one of these machines that the young officer in the B-25 was using that day over San Francisco to shear the Mark Hopkins Hotel from the city's hilly skyline—in theory, at least. His APQ 23 guided him to his target, dropped his "bombs" for him and then guided him back to his home base, and never once was he compelled to look at the ground.

The student officer at Mather spends interminable hours in classrooms learning merely how to tune up and calibrate his machine in preparation for a bomb run. And Mather's radar experts demand that calibration be carried out to "within a gnat's eyelash," or fatal error will send the bombs awry.

It might have been calibration to within something less precise than a "gnat's eyelash" that caused a cropper which is still a standing example at Mather of how not to fly a radar bombing mission. The mission was to drop practice bombs on one of the circular ground patterns of the bombing range at Camp Beale, near Marysville, California. But the student in point mistook the main pumphouse at Camp Beale for the target. Luckily, he missed it by 160 feet. Camp Beale isn't in use now, but the pumphouse, as one of Mather's instructors remarked dryly, "is a fairly valuable piece of property Uncle Sam might not want to lose."

For global navigation, beyond the 300-mile range limitation of the APQ 23, the triple-threater relies on another radar device called LORAN. The initials stand for Long Range Radar Aid to Navigation.

LORAN involves the use of ground stations operating in pairs at various Air Force installations around the world. At frequent intervals each pair of stations sends out far-reaching signals, one immediately behind the other. The time differential between these two signals is measured to 1/1,000,000 of a second on a LORAN receiving set in the navigator's radar compartment. Plotting this measurement on his LORAN chart then enables him to determine exactly where he is.

A paramount virtue of LORAN, besides its accuracy, is the fact that it permits navigation without breaking radio silence—a precious asset in wartime.

(*Continued on page 49*)

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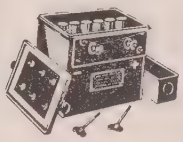

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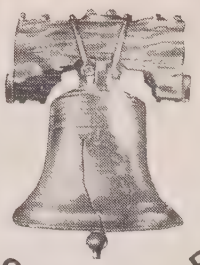

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# Watch Out for Ice

(Continued from page 27)

cold. A warm air mass had begun to creep over Amarillo, but meteorology informed us we would arrive there before the clouds had settled too low. We got there all right, but for the last 30 miles or so we worried under lowering clouds in a freezing drizzle. Our de-icer boots were operative, but we had no alcohol to keep our windshield clean, and it was this that gave us a fit. We made it, with the side and front sliding windows open, but it was a chilly experience and it emphasizes the fact that even when outside visibility and ceiling are within Visual Flight Rules, view from the cockpit may not be.

Usually ice will not be strictly rime or clear, but will be a combination of both. To quote from a Navy publication on the subject: "*. . . in the combination, the ice will be more clear than rime or more rime than clear. In either case, the ice formation will adopt the characteristics of the dominant type. If the formation is more clear than rime, you should watch for all the hazardous characteristics of clear ice. On the other hand, if the ice is mostly rime, don't overlook the fact that it may have some characteristics of clear ice that will make it harder to break loose than if it were pure rime.*"

A likely place to acquire a combination of rime and clear ice is downwind of the Great Lakes, particularly behind a cold front when a northerly circulation is carrying stratocumulus snow showers across this area. As you fly in and out of the showers, you attract mostly clear ice in the cumulus, and rime ice in between. One thing about this situation, the bases are generally only down to 1500 to 3,000 feet with tops to 7500, occasionally swelling to 12,000 in the showers. Severe icing will mark those high domes.

Another place clear and rime like to gang up is over hilly or mountainous country; south to east of Pittsburgh, for example. It is particularly true here whenever a moderate-to-strong pressure gradient prevails with a flow from Lake Erie over this area during the months from November through April. The already unstable moist air off Lake Erie is further excited by being heaved over the ridges.

The gathering together of rime and clear ice mentioned above is in company with cold air masses. Let's take a glance at a situation where a warm air mass is advecting over a cold mass, as in a warm front. In such an instance, rime predominates in the higher stratus decks where temperature is well below freezing, while sleet and freezing rain are common in the subfreezing layer below the warm zone and adjacent to the surface. As the warmer air rides up over the cold air, it changes the lapse rate (change of temperature with altitude) from one which did offer below-freezing temperatures from the ground up, to a lapse rate which is now below freezing only up to 2 or 3,000 feet, then jumps above freezing in a zone of warm, moist air. Then at the top of the inversion, or warm zone, a rather steep lapse rate retreats rapidly to below freezing. Incidentally, clear ice is also usually heavy in the saturated area above the inversion, even though it is a stratus cloud. This area is often so moist it is practically pure ice.

**FIRST** of 100 canadian-built *Sabres* recently made its test flight. Later production models will be powered by A. V. Roe *Orenda* jet engines instead of J-47's

A cold front is not so widespread as a warm one, but it can present a more dangerous icing condition to try to fly through, especially if moist, unstable air is being undermined by the front. The swift convection taking place in the vicinity of the front will carry an excessive amount of supercooled water to high levels where dangerously clear ice will be present. Because of the heights to which cumulus clouds tower, topping of the ice area is difficult for unpressurized airplanes.

For occluded fronts (where fronts overrun each other), just multiply the troubles of a cold front by a warm front. Best seek professional advice if you plan a flight through such an ice box, and you had better be pretty much a professional yourself!

Summarizing a bit, since ice can't accumulate any faster than liquid water is deposited on the plane (frozen water, such as ice crystals, sleet or dry snow, can't hurt since they are already frozen and won't stick to the plane), the regions of greatest hazard are those where the most liquid water is available at freezing temperatures. Such a region comes into being when a mass of air begins a journey warm and moist and is then cooled rapidly by lifting. Such lifting can be forced by frontal action or terrain. But if the air, before lifting, was quite cold or dry, it cannot contain much moisture and any clouds that form in it will be relatively thin and produce only light icing. At quite cold temperatures, 15° or 10°F. or below, even moist air manufactures mostly rime—except in cumulonimbus clouds where the extreme up-flow supports liquid water even at very cold temperatures. In general, the type cloud indicates the ice class: Stratus—rime, Cumulus—clear.

Now that we have touched the high spots on types and causes, let's observe some practical aspects of icing. For instance:

In early March of 1943, a DC-3 departed Kansas City to Wichita. The flight plan was filed for and the flight cleared at 4,000 feet mean sea level. This put the plane below the base of a heavy overcast. As Wichita neared, light snow was encountered. The wind at 4,000 was 40 mph from the northeast, while the temperature varied from 16° to 20°, increasing as the plane moved westward.

When the flight passed over Wichita, it was cleared to climb to 6,000. This placed the aircraft in the base of the clouds. A light accumulation of ice was noticed during this phase of the trip. The temperature remained constant between 16° and 18°. At Gage, Okla., which is 164 miles southwest of Wichita and 133 miles northeast of Amarillo, the ice momentarily became heavier and the pilot decided to climb to 8,000 feet, which would be above the forecasted top of the icing condition. However, between 6,000 and 6500 feet, the temperature suddenly jumped to 30° and the icing became severe. The captain was unable to force the plane above 7,000 feet so descent was started at once on a reverse course. At 5,000 feet an attempt was made to level off, but this altitude could not be maintained because of the ice accumulation. Sufficient power was available to hold 3,000 feet and the flight returned to Kansas City at this level. Wichita was below limits. Moderate to heavy snow existed throughout the return to Kansas City. When the airplane landed, it still carried a load of ice, since the snow largely prevented the evaporation of the ice. This illustrates what can happen when a warm front is on the loose. The ascent into the warm air above the cold surface layer put the plane in the area that produces maximum icing: moist air near freezing.

Here is something else again: It had been necessary to leave a transport outside during the night and to run up the engines occasionally to insure easy starting prior to dispatching a trip which had been delayed due to weather. The air temperature was 4°F. and the dew point 4. Visibility was ⅛ mile, a dense fog prevailing. Both temperature and dew point had dropped from 12°F. during the preceding 1½ hours. At 8:00 A.M. the engines were warmed up for a period of approximately 15 minutes at speeds varying from 500 rpm to 1400 rpm. After the engines were shut down, ice was observed on the propeller blades. This ice was very hard and difficult to remove from the blades by manual means. It was pure rime and extended to the tip of the blade, being one inch thick on the leading edge of the blade.

It goes without saying how serious a takeoff might be under such circumstances. The fog particles merely needed a fast-moving object, in this case a propeller, to freeze to.

No one has more experience in day-in and day-out flying in all kinds of weather, including icing, than the airlines. Their regulations are designed to insure safety. In

the main, their rules require that no take-offs shall be attempted in freezing precipitation or when frost is adhering to the airplane; no climb shall be made through known moderate icing conditions immediately after take-off unless the airport of departure has ceiling and visibility of at least 800-2, 900-1½ or 1,000-1 and conditions are suitable for the aircraft to return and land should it encounter heavy ice; no let-down through moderate icing shall be made unless destination airport enjoys same minimums as above; no aircraft shall be intentionally flown in heavy icing conditions; no landing shall be made at an airport with freezing rain, moderate or heavy freezing drizzle or moderate or heavy wet snow. In addition, there are other restrictions applying to enroute operation which further promote safety.

Should some pilots be confused as to what classifies light ice as against heavy ice, for instance, the following definitions should clarify the matter.

*Trace of ice*—An accumulation of non-consequence, which does not affect the performance of the aircraft but should be reported by air carrier pilots for meteorological purposes.

*Light ice*—A condition which can be handled safely and indefinitely by standard de-icing equipment.

*Moderate ice*—A condition which the aircraft de-icing equipment will safely handle but which, for practical flight purposes, can be considered a signal to the pilot that it is time to alter the flight path so as to avoid operation in that condition.

*Heavy ice*—A condition which de-icing equipment cannot handle.

Probably as good a way as any to cut the switch on this piece, is to borrow from here and there the more important rules of flying safety as applied to icing. They are:

1. In freezing rain, climb into the above-freezing air where it's plain rain.
2. Sleet falls out of a region where severe icing is taking place, so stay where you are.
3. In wet snow, climb to an altitude where it is colder and the snow won't adhere so readily. In dry snow, you're okay.
4. The colder it is, the less likely you are to attract heavy ice.
5. You won't automatically suffer ice just 'cause you are in a cloud, but if near-freezing temperature exists, be alert for ice.
6. Turn on pitot heat in anticipation of moisture—before you begin your take-off run, for instance.
7. De-ice the props in anticipation of ice. Don't wait until it is well on.
8. If alcohol doesn't do the job on the props, increase rpm periodically to throw the ice off.
9. Move throttle occasionally to prevent it freezing.
10. If manifold pressure starts to drop or engine roughs up, apply carburetor heat. If in doubt, put heat on and leave it on.
11. Remove snow, frost before take-off.
12. Avoid turbulent areas—that's where the toughest ice awaits.
13. If you must ascend or descend through icing clouds, do it fast.
14. Ice interferes with lift and thus increases stalling speed—so watch your flying speed!
15. The runway may be slick; use caution in landing and taxiing.

# Triple-Threaters

*(Continued from page 47)*

The triple-threater also uses a special radar altimeter to give him his exact altitude at all times, taking into account the constantly fluctuating terrain below him. It has its own scope. But instead of the rotating finger of amber light which he sees on the scope of his APQ 23, the altimeter scope shows a wavy green, neon-like circle. Only when the surface below him is absolutely smooth—and that, of course, occurs only when he's flying over water—does the green circle stand motionless.

So inexorable is the march of aviation science that even finer and more versatile radar equipment is on the way, according to the brasshats of the Bombardment School.

In the course of his eight months of arduous training, the student navigator-bombardier-radar operator flies long navigational missions in C-54 and C-47 "flying classrooms," sometimes far out over the Pacific and back. He also flies several different kinds of B-25 radar bombing missions.

One involves the dropping of practice bombs on ranges at Camp Beale and Tonopah, Nev. Another is called a "photo scoring mission," with cameras installed to take pictures through the bombsight simultaneously with "Bombs Away". The third entails "dry runs" on industrial and military targets near San Francisco, Sacramento and Stockton, where radar ground computer stations are located to measure the accuracy of the "bombing." Or they may be non-scoring "dry runs" on any target in the congested northern California area, simply for the purpose of attaining technical facility with the radar equipment.

It was on a mission such as this that I flew with two Mather students, Lt. Thomas M. Robinson of Howland, Maine, and Lt. Charles A. Lewis of Phoenix, Ariz., along with their instructor, Lt. L. F. Warren of Forty Fort, Pa. Squeezed in beside the curtained plexiglas window of the radar compartment, I watched while Robinson and Lewis "picked off" one after another of 14 targets during a five-hour flight.

Missions such as that one of ours may be "dry runs," but they're never "milk runs." "Bombing" the Mark Hopkins, for example, meant singling it out from the whole downtown welter of San Francisco—a pinpoint in a forest of pinpoints. Small targets are chosen deliberately, since the B-25 flies at relatively low altitudes. But the triple-threater-to-be is thus confronted with a problem comparable to that which he'll have to solve in bombing a larger area from 40,000-foot altitudes.

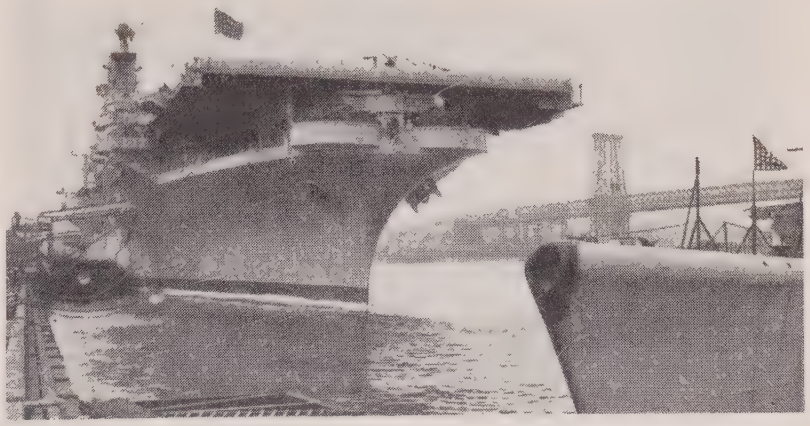
That's the way the missions go at the Bombardment School. The target might be an oil tank in a small coastal city that's invariably fogged in. Or an Army camp which is almost indistinguishable on the radarscope from a nearby town. Or a railroad overpass at Fresno so hard to pick up from the air that even an instructor couldn't find it when he went along on one of the missions. (He swore it had been dismantled when his back was turned!)

As one instructor put it: "I try to pick out tough targets—as tough as I can find—and make the boys really look for 'em. The targets of a future war are going to be awfully tough. They're going to be underground and camouflaged."

That, when you get right down to it, is what the triple-threaters are getting ready for—a future war. They hope as devoutly as the rest of us that it never comes to pass. But if it does, they will be front and center on the stage, since the next war almost inevitably will mean the use of the A-bomb and possibly the H-bomb.

The Bombardment School knows from first hand what the implications are. One of its faculty members, Capt. Victor L. Dreesen, was bomb analysis officer for Operation Crossroads at Bikini and flew on the mission in which the surface bomb was dropped. Major Thomas W. Ferebee, who was the bombardier on the Hiroshima run, and Major Harold H. Wood, who dropped the bomb at Bikini, have both gone through the Bombardment School.

If the triple-threaters seem to be going about their business with an uncommon gravity and seriousness of purpose, it's because they realize that they are preparing themselves for the same job—should the time ever come. And the job will be to deliver that awesome payload to the enemy C.O.D. and hit 'em where it hurts the most.



**NEW CARRIER** is the Essex-class 37,000-ton *Oriskany*, shown here at Brooklyn Navy Yard. It is the first Essex-class carrier to join the fleet since 1946

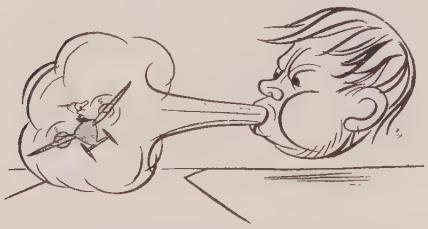
# Dilbert

(*Continued from page 34*)

low, as this will tend to avoid the possibility of a nose-over should the wheels strike a soft spot before flying speed is reached.

**Crosswind Technique**—After what happened the other day, Dilbert probably thinks a crosswind is one that is boiling mad. While bringing in a two-engine job, he noticed he had quite a bit of left drift. He attempted to correct for it with throttle, using 30 inches of manifold pressure on the right engine and 15 inches on the left. The next thing Dilbert knew, his left wing dropped out from under him and he landed all over the place.

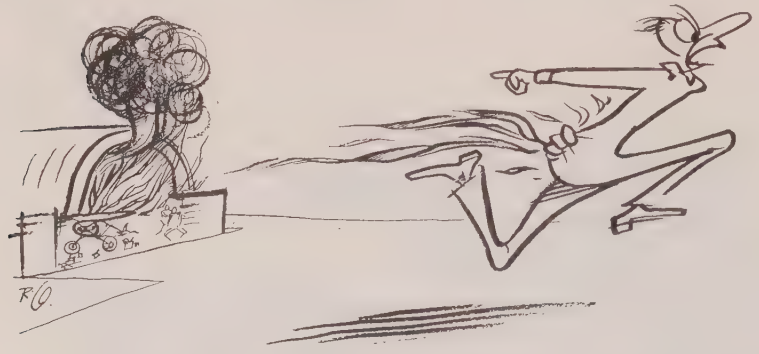
All of which opened up the old argument on crosswind technique. Some pilots argued that you treat all planes alike: either lower the windward wing and slip into the wind, or crab into the wind, or combine the two.



Granted you can land anything this way, and it's about all you can do with a single-engine plane. But with multi-engine aircraft, *particularly* the heavy babies with sluggish reaction to ailerons at landing speeds, you can do a much smoother job with a little expert throttle jockeying.

Dilbert had the right idea but, as usual, went off half-cocked. It requires expert technique and much practice to learn just how much power is needed for varying conditions. Here's how to practice:

1. Practice in an area where you can get low enough to the terrain to definitely notice drift (but not too low, please!). Pick out a road or fence about 90° from the wind. Let this represent your approach line.



2. Slowly add upwind power. This will tend to put you in a downwind turn. *But*, keep the wings level and use enough upwind rudder to head straight down the road.

The trick is to learn to use just enough of this power slip (which, in effect, it is) to counteract the drift. Also, there's the little matter of maintaining the necessary differential of power as you reduce throttle.

In addition to identifying you as an expert, this smoother landing method has another advantage. Your extra upwind power will tend to prevent the plane from swinging into the wind after landing.

Remember now, you're going to practice this thing at altitude until you are sure you've got it. Don't pull a dilbert!

**Pyromania**—If you want to get rid of your airplane, one of the easiest ways is to burn it up. Below are listed, for your convenience, several sure-fire methods.

Welding is one of the most popular. Be sure, however, not to rip the fabric away from the vicinity of the weld; the fire must have something to catch and feed on. Also, allow no one to stand around with a fire extinguisher while you are welding. They might douse the flame before it really gets started. If you want to burn down the hangar, too, be sure and do your welding inside, but not so near an open door that it can be rolled out quickly before it really gets blazing.

Another very effective method is to put on a fabric patch and then speed up drying with a heating lamp. You don't need to use a blow torch as one chap did; dope is very inflammable and will easily ignite. In fact, you don't even have to use dope. An electric light bulb placed on or near any fabric will usually generate enough heat to start combustion.

Many an airplane which was being cleaned with gasoline has mysteriously gone up in smoke. Also, a lighted match or cigarette carelessly dropped in the right place will do the trick, but that's a bit too obvious. Be original. Just remember that to start any conflagration all you need is something that will burn, and heat enough to set it on fire. Your airplane is one big tinder box; all you have to do is kindle it.

**Geese Are Smarter Than People**—Geese are supposed to be simple-minded and dumb, but I claim they are smarter than some pilots. Seaplane pilots often crack up on take-off, but did you ever hear of a goose that did? The reason is that a goose always chooses the longest run into the wind, which is free of all obstacles. Be dumb like a goose!

# No Brakes On My Side

(*Continued from page 38*)

forgiven the airplane for the propeller-breakage of a few days back when my student looked in horror at his legs. My eyes followed his. The calf of one leg was reposing in a pool of acid on top of the uncovered battery box! An enraged student and a wild-eyed instructor wheeled the plane around and tore back to the terminal. Later, with the student washed off with soda water, his jeans cut off at one knee and the battery covered up, we trundled out again and made our way back to the home field.

One of the beginning instructor's most dreaded moments comes when he must solo his first few students. Like so many things, this usually proves to be less worry than had been anticipated. Actually, most of the instruction is done in the first six hours. The remainder of the pre-solo period is a rehearsal for solo. Nothing much is said as the instructor tries to let the student make his own decisions and settle into a firm "rut" of habit around the pattern.

No matter how many times an instructor has soloed students, he still gets a kick out of seeing the airplane make that first exciting take-off with the student flying it alone. He is especially proud to see his boy gravely maintain his altitude, dodge other aircraft and even on occasion notice a wind tee change. With the first cautious landing safely accomplished the instructor feels a real fondness for his student.

One of the more rewarding aspects of instructing is the fact that almost every student becomes a friend.

Safety habits learned while instructing are valuable in later flying. As a matter of habit the instructor checks that all passengers' safety belts are fastened and that the plane used for dual and solo hops is okay to leave the line. It's little things that add up to a good safety record, safety belts out of the way of controls, oil caps tight, tail-wheel springs fastened, etc.

Several habits have really paid off for me, such as teaching the students to watch the prop and listen to the engine while doing stalls or glides, avoiding the habit of undershooting, and examining stall possibilities from every angle. Even though it takes more talking and the risk of being called an "old-woman" type of pilot, every possible emergency from heavy traffic to weather and engine trouble should be covered before a student's training is complete.

Other instructors agree that flying for a living is strictly sport. Every day is different and interesting. There are no walls about a pilot at work. Each airplane is different and no two hours of instruction are the same. Supervision is limited to advice on new airplanes and methods of training.

New airplanes arrive to be pounced upon by the pilots. "Tell us how to start it. We'll fly it."

Not only do the hours spent flying result in changing personalities and scenery but we observe the day-to-day changing of the seasons beneath our wings. Aside from the fun of flying, teaching it has taught me more, I think, than I have managed to teach! As a most rewarding, stimulating work, flight instructing is mighty hard to beat.

# Pack Carriers

(*Continued from page 33*)

use of streamlining doors which open at both ends of the cargo compartment, thus permitting both fore and aft truck-bed-to-airplane loading. This first XC-120 pack or pod is purely an experimental one and will be used for study and development purposes by various interested agencies in the air and ground forces. It was not designed for the extreme mobility of commercial trucks because of the clearances required for highway and railway travel, but limited mobility was obtained for the XC-120 pod through the use of removal wheels mounted at its four corners. This allows the removal of the pack from the ramp area to a loading zone on or near the airport terminal.

Possibilities of a droppable pack or packs similar to the "paracan" have received their share of study, and smaller packs suitable to particular missions, such as ammunition or rations, are being designed. In this feature, the postwar method of "cocooning" supplies and equipment can be applied directly to the pack concept. Under this system, equipment, food, parts, engines, and ammunition could be sealed at the manufacturer's or supply terminal, shipped intact by airplanes, boat or rail and stored indefinitely at the destination until needed. Designs of packs similar in shape to the commercial trailers with rear wheels and forward standard tractor hitches could be designed for extreme road mobility. The packs could be used interchangeably with carriers or pack-carrying helicopters of equivalent carrying capacity. Thus, a pack-carrier plane such as the XC-120 could land at an airport nearest to the pack's ultimate destination, and then the pack could be hoisted and hauled away by tractor on the highway, loaded on a train or surface vessel, or airborne to the final destination with the use of heavy-lift helicopter. The helicopter and pack feature would be of exceptional use in an arctic rescue mission where the approach by conventional aircraft is limited. The pack could be lowered and the personnel loaded aboard for the trip to the base of operations.

With the advent of this type of carrier and pack arrangement, many conditions must be taken into consideration. One condition of importance to the over-all project is the reduced turn-around time for the tractor or carrier unit. Without the detachable feature, the entire unit or airplane must wait during the loading and unloading operation. Not only is the unit delayed but the indirect costs of flight and cargo crews must be added, plus the inconvenience of staggered working hours required for cargo loading and handling. Several instances have been observed where cargo had been loaded into a conventional-type airplane only to have engine trouble reported. This then has necessitated the removal and repacking of the cargo into some other plane. Other experiences have been noted where cargo was held up due to weather, when the aircraft could have been used to make another flight with some other cargo to another market. Experiences such as these are exceptions, but operating costs continue to add up. Insofar as the departure airport is concerned, the stop-over time is reduced in the same degree as the turn-around time at the destination airport. The more complex the loading problem, the greater the congestion at the loading or unloading point.

The problem of air freight has been studied by various airlines and aircraft companies, but our greatest portion of experience and lesson on "know how" was gained in the recent Berlin Airlift. Commercial air freight is not on the same volume proportions as the airlift, and the need for everyday living requirements would be too expensive to ship by air, but indications of a cheaper, growing air-delivery business may find our present-day airports as busy and congested with freighters as they are with passenger airplanes.

Although maintenance of the conventional aircraft and the pack-carrier combination may be considered equal, the life and design of each should be studied with care. The carrier-type airplane can be built without the thought of the luxuries that are needed in the passenger carrier. The cargo carrier is built for just one job—to carry freight. With the pack- (or pod-) type compartment, cargo can be kept independent of the main airframe and experiences such as coal dust or flour filtering into the surface control cables can be eliminated. With the pack, wear and tear on the airplane from cargo loading is confined to a relatively inexpensive pack rather than a completed airframe. This, therefore, increases the life of the carrier and cuts overhaul periods to a minimum.

A recent study has shown that the over-all air-freight problem is not in the flight speed of the airplane to facilitate fast delivery to the consumer, but in the handling of the cargo from manufacturer to truck, truck to warehouse, warehouse to truck, truck to airport, airport to airplane, and at the end of the flight the reverse procedure. This procedure is again hampered by the volume of paper work to insure the security of the freight. The present-day handling problem may be reduced to a certain degree, but the main point to consider is that the actual cargo flight time on short hauls between two cities is less than 20 per cent of the total time, depending on the distance flown. Another point to consider in this procedure of handling cargo is the damage inflicted on the cargo. This can be kept to a minimum by eliminating excessive handling. In this respect, the detachable pack can be used as a mobile pallet on wheels. A pack designed as a mobile trailer could be preloaded at any point and shipped directly to the airport, hoisted to the carrier and continued on its way. At the time of loading, detailed consideration could be given to the density of the cargo, the center of gravity requirements and the final lashing or tieing down of the material to be transported. The only restriction, timewise, placed on the shipment of the cargo would be in the ability of the ground transport crew and the small hoisting organization to maintain a "round-the-clock" schedule.

For one-way deliveries of supply and equipment, the pack-type carrier could "dead head" without its detachable cargo compartment. Under an efficient system and management with terminals at the leading cities, however, this condition could be an exception rather than a common occurrence. If the pick-up of this pack were impossible due to costs, it could be shipped or towed

(*Continued on page 54*)

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946

Of SKYWAYS published monthly at New York, N. Y. for October 1, 1950.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. Fred Henry, who, having been duly sworn according to law, deposes and says that he is the Publisher of SKYWAYS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, weekly, semiweekly or triweekly newspaper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the act of August 24, 1912, as amended by the acts of March 3, 1933, and July 2, 1946 (section 537, Postal Laws and Regulations), printed on the reverse of this form, to wit:

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2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) J. Fred Henry Publications, Inc., 444 Madison Ave., New York 22, N. Y.; J. Fred Henry, 300 East 57th St., New York 22, N. Y.; Gladys Lois Henry, 300 East 57th St., New York 22, N. Y.

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(Signed) J. FRED HENRY,

Sworn to and subscribed before me this 28th day of September, 1950.

(SEAL) STANLEY M. COOK

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*(Continued on page 54)*

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(*Continued from page 53*)

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# Pack Carriers

(*Continued from page 51*)

by rail or truck. In many cases, the reduction of weight and drag due to the lack of the compartment or pack on the carrier would reduce the fuel consumption and increase the speed of the carrier to a considerable degree and allow an increase in utilization of the carrier for another flight to add to the ton miles carried per carrier. The carrier less the pack could be effectively utilized to carry bulk material such as fuel tanks, pipe and large boxes by lashing the material to the flat bottom of the carrier. Much of this equipment is being carried internally on our present-day aircraft, especially in aircraft operating in South America.

The detachable pack has several distinct disadvantages when compared with the conventional airplane. The pack designed as an individual component from the carrier must assume various airloads and, if intended for ground mobility, must be constructed accordingly. The conventional aircraft, however, is built around the cargo capacity alone. The apparent weight increase of the pack is in addition to the structural weight required for the other components such as the tail group booms or surfaces to resist the additional moments being applied. The amount of weight added for ground mobility should be proportional to the amount of time and conditions of travel. The trailer for around-town hauling such as the air pack, is not constructed and operated as a semi-trailer would be that operates between Chicago and New York. Another disadvantage of the pack is the method of providing landing gears of extreme length to give proper pack-to-ground clearance, plus the landing gear retraction mechanism, if needed. The problem of landing gears should not penalize the carrier too much. Whether the gears retract or remain stationary is a point directly concerned with drag and speed. The freight aircraft should not consider speed of prime importance. Therefore, simplicity of the fixed gear, would be fairly attractive.

Many plans and methods of recovery also have been formulated for jettisoning the pack in flight. Recent rescue life raft drops by parachute have demonstrated the possibilities of such a method of delivery.

The detachable pack cargo airplane effectively fulfills the prime requisites demanded by both the military and commercial cargo industry. To utilize the potential of this type of aircraft a new concept of cargo handling can be envisioned with ease of loading and low cost of operation. Freight congestion can be eliminated from overcrowded airports, and existing commercial freight terminals can be used, therefore eliminating the expense of a new or modern-type terminal built for the conventional-type airplane and present-day methods of operation. With the freighter aircraft, a definite type of airplane can be built for the job, eliminating the extras that are built in for passenger service. The pack-type airplane provides flexibility of operation, reduces ground handling cost and time, and minimizes the number of aircraft required by an operating agency. And all this gives the public the fast, low cost and efficient service that they are waiting for.

Air Defense and how its procedures are affecting civil aviation....page 57

# NAVICOM

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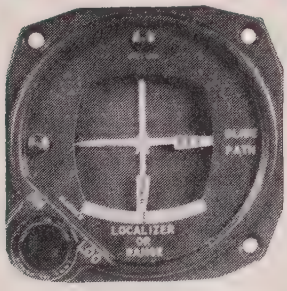


ARC's Omni-ILS Indicator

Radio failure procedure explained by chief of CAA's Air Traffic Control Division.....page 60

Edited by Col. N. F. Silsbee

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# Air Defense and Civil Flying

## Board created to set up procedures for continuation of civil flying in event of war

Recently it was revealed that during the summer a charter was signed by D. W. Rentzel, then Administrator of CAA and Lauris N. Norstad, Vice Chief of Staff, USAF which created a Joint Civil Aeronautics Administration—U.S. Air Force Air Defense Planning Board.

The Board consists of four representatives from each agency, all to be cleared to handle Top Secret material.

▶ **Board Duties.** The main duties of the Board are outlined in a Master Plan, as follows:

(1) Review the plan for security control of civil air traffic, dated April 1, 1949 and, based thereon, develop a comprehensive plan for the recognition of friendly air traffic.

(2) Develop methods and procedures necessary to channel data required by the Air Force into the Air Defense Control Centers (ADCC) and/or Ground Controlled Interception (GCI) Stations.

(3) Develop plans for the integration of certain military flight services with corresponding elements of the CAA.

(4) Investigate and recommend systems and means for the recognition of friendly aircraft flights, both civil and military, within and entering into the United States, its territories and possessions.

(5) Review existing and proposed plans and make recommendations for the utilization of those facilities and personnel of the CAA essential to Air Defense in time of a national emergency.

(6) Formulate plans and recommend policies for the responsibilities of the CAA with respect to Air Defense.

(7) Where it is deemed necessary to recommend legislation to implement the various plans and policies recommended by the Board.

▶ **Civil Flying Rules.** The Air Force recognizes that should there be a war, there would also be an increase rather than a decrease in civil flying, with this mainly in transport, and especially in the field of industrial aid flying.

Therefore, rules and procedures must be set up right now—rules and procedures which will guarantee the continuation of civilian flying. There are of course other things, such as the control of communications (other than the CAA), that have to be set up also. And there are many other special problems connected with actual air defense operations.

What the Air Force has been doing can best be understood from a scene at one of our radar stations of which many are now in operation.

At one of these radar stations there is a fluorescent-lighted hand that sweeps around a little dial. As the radar operator looks at it, a little pip comes up—a small bright spot on the radar scope. As the hand sweeps around six times a minute that little pip moves from one place to another on the dial, showing a track. Because the pip is moving, the radar operator knows it is an airplane. Checking with a height-finding gadget, he and another operator vector on that little bright spot, and they find it is flying at 14,000 feet.

What is it? The operator checks with another controller right alongside and finds that CAA knows nothing about this pip—it's not on Federal Airways; to CAA it's an "unknown."

He checks with Military Flight Service. He finds it is not military—not a *regular* Navy or Air Force plane. All this takes but a few seconds.

About eight minutes later, while this pip is still on the scope, eight more of them show up on about the same track and about the same speed, about the same altitude.

It turns out to be a couple of Navy Reserve *Bearcat* squadrons. At the same time throughout the country at a dozen more of these radar stations the same thing is happening. In fact, it happens every Sunday morning, if the weather is any good, as our "week-end warriors" in the active reserve get in some formation flying practice.

In cooperation with the CAA, therefore, the Air Force has put these procedures into effect. As regards civil flying, these are CAA procedures. As regards military flying they are Air Force procedures. The important fact is the USAF *must* have prior information as to what that little pip is on the scope. We must not have to call it "unknown."

Instead, should the pip turn out to be a radar echo from an executive plane, the operator wants to be able to say "That is Parker Pen's Twin Beech N 5151 flying from New York to Cleveland." He can only know that if a flight plan has been filed. From an air defense point of view, we must have planes aloft completely identified.

**CHAIRMAN** of Civil Aeronautics Board, D. W. Rentzel, signed charter for new Board

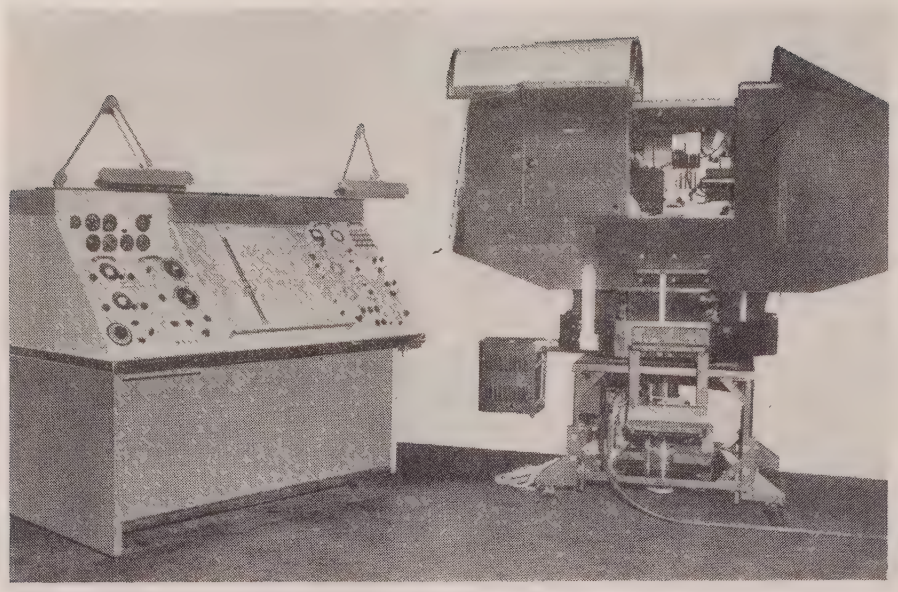
▶ **Flight Plans.** These procedures have been made through the request medium. Pilots are urged—through the bulletins and NOTAMS and in other ways—to file flight plans when crossing the Canadian border, and when flying over certain identification areas in the southeast, southwest and northwest as prescribed in the latest CAA pamphlet. When flying in those areas, which may be extended within the next few months, pilots are urged to file flight plans or signify flight intentions. This may become mandatory if things get hotter.

Two more Air Defense Areas were activated by the USAF on October 15th—Los Angeles ADA and San Francisco ADA.

If flight plans are not filed, pilots may be intercepted by Air Force fighters. This business of intercepting and identifying need not in itself be of any concern to the civil pilot or to civil flying.

It is very expensive to the Air Force, however, to have these fighters at bases all over the country and to maintain radar early warning systems. The impact on the CAA means more expense for that agency in carrying out their part of the joint program. There are tentative plans in the works for putting some CAA communicators, etc. into uniform in case of mobilization.

Nevertheless, in the face of the critical international situation, all American pilots will agree that it is a matter of the utmost urgency to accept these procedures and to get them in working order now, before real trouble starts.



**LINK** C-8 instrument flying trainer *(above, right)* is now brought up to date by addition of All-Weather Automatic Radio Aids Unit which simulates VOR, DME, ILS facilities

# Radio Trainer Unit Developed

## Link brings out trainer to simulate VOR, DME, and ILS for instructing navigators and pilots

Consistent with the new look of the airways under the current Transition Program—first phase of the Common Military and Civilian System of Air Navigation, is the new look in radio navigation and training aids. The latest electronic facilities of the Federal Airways are matched in the new Link All-Weather Automatic Radio Aids Unit.

This unit was designed to provide efficient on-the-ground training in the operational use of the latest airborne radio equipment. It simulates electronically and automatically all the VOR (omnirange), DME (distance measuring equipment) and ILS facilities. Thus, this All-Weather training unit is adequately equipped for instructing pilots and navigators in the various phases of R-O (range-azimuth) navigation which are the backbone of the Common System now being implemented.

Electronic radio facilities similar to those contained in the All-Weather unit are now standard equipment on all new Link trainer models, including the C-11 Jet Trainer and Navy's SNJ and F3D Operational Flight Trainers. And with the addition of the All-Weather unit, which replaces outmoded equipment, the older type Link trainers retain their effectiveness.

▶ **All-Weather Console** These all-weather radio facilities are packaged in an attractive straight-line console *(see photo)*. The console is a self-contained mobile unit. Located in the center is the new Cartesian Coordinate Course (ground position) recorder. On either side of the recorder are banks of controls and indicators for setting up, checking and controlling realistic flight problems.

The conveniently located system-controls and indicators of the console lighten the task of the instructor. Selected radio systems and facilities are present before each simulated flight and are automatically controlled thereafter during the flight. Except for periodic station relocation during X-C flight, the instructor is free to devote his time to actual instruction, pilot performance evaluation and simulated low and high frequency ground-control communications.

The ground-position indicator, which pen records the ground path of the airplane in flight, continuously plots the position of the airplane on standard aeronautical charts representing the actual area over which the simulated flight takes place.

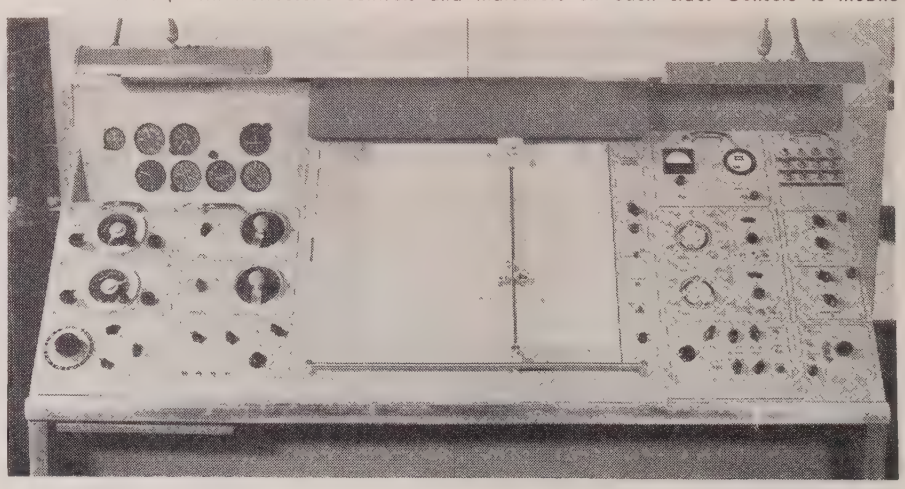
The small scales (1:1,000,000—16 miles to the inch—World Air Charts) are used for cross-country problems, permitting close to 1,000 miles straight-line flight. The middle scale (1:250,000—4 miles to the inch—Local Area Charts) enables greater definition of detail in recording shorter flights. The large scale (1:62,500—1.2 miles to the inch), with charts of appropriate ratio, give accurate tracking of instrument-approach problems.

▶ **LFR Simulation** The unit automatically simulates the signal characteristics of the LFRR (low frequency radio range). A minimum of two station locaters—for simultaneous operation—are provided with controls for adjusting the range legs, fan-marker positions, identification signals, frequency and station power to fit the particular station selected. Eight possible fan markers, two per range leg, and a Z marker are included in each range. Static, both crash and precipitation, may be introduced at the discretion of the instructor.

▶ **Automatic Signal** An important feature is the automatic signal indication for omnirange flight and instrument landing systems. A minimum of two very high frequency station locators—which may be alternately omnirange (VOR) or localizer (ILS) stations—are provided with controls for establishing the type station, geographic location, frequency, field elevation, approach bearing, maximum reception range, magnetic variation and identification signals. DME, RMI (radio magnetic indicator) and the CLC (arbitrary course line computer) are an integral part of VHF system.

The Link All-Weather Automatic Radio Aids Unit with its flexible multi-station simulation offers improved pilot training for the military, airlines and companies operating executive aircraft.

**CONSOLE** of Link All-Weather Automatic Radio Aids unit provides ground position recorder in center, with instructor's controls and indicators on each side. Console is mobile



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# Procedure for Plane Radio Failure

## Air Traffic Control chief advises filing of flight plan; gives procedure to follow in event of plane radio failure

**By CLIFFORD P. BURTON**
*Chief, ATC Div, CAA*

What should a pilot operating on an IFR flight plan do when two-way radio communication between his aircraft and the ground fails to function? According to the CAA's *Flight Information Manual* the procedure is as follows:

a). If operating under VFR conditions (which means that you can see at least three miles ahead and by observation can avoid collision with other aircraft) proceed under VFR and land as soon as practicable, or

b). Proceed according to the latest air traffic clearance.

If the pilot proceeds according to latest traffic clearance but has not received and acknowledged a clearance to the tower, and if other instructions to the contrary are not received, he is expected to observe the following, and control will be effected accordingly:

(1) If the pilot has received and acknowledged a clearance to the destination airport or the radio facility serving that point, he shall continue flight at the altitude (s) last assigned by ATC, or the minimum instrument altitude, whichever is the higher, to the radio facility servicing the destination airport. (The minimum instrument altitude is the minimum established for that portion of the route over which the operation is conducted, regardless of the direction of flight.)

(2) If he has received and acknowledged a clearance to a point *other than* the destination airport or its radio facility, he shall continue flight at the altitude (s) last assigned by ATC (or minimum instrument altitude, whichever is higher) to the radio facility serving the *destination airport.*

(3) If holding instructions have been received, the pilot shall comply with these instructions until such time as it will be necessary to continue flight so as to arrive at the radio facility serving the destination airport at the expected approach time last received and acknowledged, maintaining the last assigned altitude or minimum instrument altitude, whichever is higher.

(4) If holding instructions have been received, but *no expected approach time* has been received, the pilot shall comply with such holding instructions until the time ATC has specified that further clearance may be expected. He shall then continue maintaining the last assigned altitude or minimum instrument altitude, whichever is higher.

▶ **Landing Approach Procedure:** Descent from the altitude maintained to the radio facility serving the destination airport shall be made on the final approach course and shall start at the expected approach time last received. If no expected approach time was received, descent shall be started at the last estimated arrival (ETA) specified by the pilot, or as soon as possible thereafter. A full standard instrument approach should be executed unless a VFR approach can be made.

An example (actual case) may make this procedure more clear. When Captain Lewis, an airline pilot with thousands of hours under his belt, was a new captain he was on a flight which had just departed Wichita, Kansas for Kansas City, Missouri. The weather was bad and he attempted to change the frequency of his transmitter from that used by the control tower to his airline company frequency, when the changing mechanism of his transmitter jammed. It would not work on any frequency. His navigation equipment was operating normally but it was impossible for him to report his position or to acknowledge subsequent traffic-control clearance from ATC. He could listen, but he couldn't talk.

On his departure from Wichita, ATC had cleared him to Kansas City to maintain 5,000 feet. His expected approach clearance time had been issued as 1457 CST or 2:57 p.m. He would need another clearance as he approached KC to descend and land when his turn came.

**CHIEF,** Air Traffic Control, is C. P. Burton

According to rule (1), he proceeded to Kansas City arriving over the radio station at his assigned 5,000 feet. It was just 1442C or 2:42 p.m., which was 15 minutes ahead of his assigned ETA. So he held at the radio station at 5,000 feet and started circling, waiting for his 1457C approved approach time.

However, the Air Traffic Control Center and Tower on the ground had not been idle all this time and at 1450C, or seven minutes before his assigned time, Captain Lewis heard the voice portion of the radio navigation station broadcasting a message to him. The message he picked up in his earphones (through the aircraft's radio receiver) said that he was now cleared to land on the airport, that all aircraft underneath him had made their landings and the way was clear. So he went on in without any further trouble.

▶ **ATC Info** How did the ATC Center know he was up there? When Lewis failed to answer calls after departing Wichita, both the company and ATC knew that something had happened and that probably his transmitter was out. Because of the clearance given and acknowledged, they knew that his only authorized procedure was to come on to Kansas City and land at 1457C. There were other planes ahead of him but ATC knew that they had until 1457C to clear the way for Lewis.

They did some other things. They asked an intermediate radio station along the route to listen for an airplane at the time he was calculated to pass over. They did report hearing an eastbound ship at that time. This of course was not a positive position or identification, but it was a pretty good coincidence.

ATC also alerted the tower at Kansas City with full particulars as to the emergency. Other aircraft in the area cooperated and by 1450C the approach lane was cleared for Captain Lewis to land. Then the broadcasts to land were started through the radio station, the control tower and the airline company radio. That was the final step.

Actually most airliners have standby radio equipment so if one set fails another can be used. This is also becoming very largely true of multi-engine executive-type aircraft such as the Twin Beech, Grumman *Mallard*, converted DC-3's and Lodestars, etc.

In case of failure, however, the procedure as outlined applies to pilots of all aircraft flying an IFR flight plan, including the increasing number who fly single-engine planes equipped with two-way radio and flight instruments. As a matter of fact, the possibility of radio failure adds another to the many good reasons for filing flight plans as a matter of normal procedure.

# Status of Transition Program Pointed Up

**By Chas. F. Horne**

***Federal Airways, CAA***

The status of implementation at September 1, 1950 of the Continental United States programs may be outlined as follows:

(1) The Instrument Landing System (ILS) program: 350 were proposed by the SC-31 Report, 92 commissioned and 171 authorized through fiscal 1950-51.

(2) High Intensity Approach Light program: 350 proposed, five commissioned, 33 authorized in current fiscal year.

(3) Distance Measuring Equipment (DME) program: 816 proposed, none commissioned (facilities presently operated for test purposes), 439 authorized this year.

(4) Precision Approach Radar (PAR) program: 96 proposed, four commissioned, 28 authorized this year.

(5) Airport Surveillance Radar (ASR) program: 172 proposed, four commissioned, 56 authorized this year.

(6) VHF/ADF Equipment program: 228 proposed, none commissioned to date, 62 authorized this year.

(7) Omnirange (VOR) program: 466 proposed, 294 operating, of which 271 were commissioned as of September 1st, 415 authorized through current fiscal year. In addition, there are 64 VHF two-course visual-aural ranges (VAR) which will ultimately be converted to omni operation.

(8) Mechanical Interlock program: 50 proposed, five commissioned, 48 authorized this year.

In addition to the above, programs for Secondary Radar, Airport Surface Detection Equipment, Air Traffic Control Signal System and Airport Time Utilization Equipment may be realized.

## Airport Capacity is Key Factor in RTCA Program

As Air Coordinating Committee's Operational Policy Group labors to come up with a clearly defined set of operational policies and requirements for the Common System, its members have found that airport requirements go far beyond those contemplated only five years ago, when the Airport Act became law.

No matter what may be achieved in the program for increased speed and safer spacing of aircraft moving in the air space, airport rate of acceptance will be a factor limiting the volume of air traffic that can be moved between points of departure and points of destination.

No matter what precision control techniques may be provided to expedite landings and take-offs, the capacity of the airports used will determine the ultimate air traffic volume.

The RTCA program for an all-weather air traffic control system has made necessary a capacity appraisal of terminal airports by the ACC, with the cooperation of the Airport Operators Council. It is found that civil aircraft in commercial operations require much time at airports, large airliners taking 30 minutes or more for unloading, loading, service and fueling. It is thus obvious that the present taxiway, ramp and apron capacity of our largest civil airports will reach a saturation point in a very few hours if aircraft arrive on the runways at the rate of 40 per hour, or at 90-second intervals as now planned.

To help visualize what the situation would be today if traffic controllers should direct the landing of transports at 90-second intervals at two of our large terminal airports, a carefully timed experiment has been performed.

At the end of a three-hour operation at Airport 'A', 32 of the 120 aircraft accepted still remained on the field occupying loading or apron space; 26 of the first 40 were being worked on at the end of the first hour; 29 at the end of the second, and 32 at the end of the third. This was rapidly approaching saturation point. The results at Airport 'B' were slightly more unfavorable. This type of fact-finding will lay a foundation paving the way for funds to keep terminal airports in step with all-weather system requirements.

## New Book on Omnirange Brought Out by Zweng

Charles A. Zweng's newest book *Flying the Omnirange* provides a simple and practical text on the use of the new VHF radio navigation facilities now in operation in all parts of the country, or in final stages of development.

These include VOR (visual omnirange), DME (distance measuring equipment) and CLC (course line computer). It is written for the average pilot, and not for the technician.

The book compares VHF with the old LF four-course range; outlines the transition program; explains the operation of the omnirange transmitter station and the airborne omnirange receiver.

It also contains a detailed 500-mile cross-country flight, using VOR navigation, and describes the A.R.C., Bendix, Collins, Lear, Mitchell and NARCO omni receiving equipment.

A short chapter on DME and CLC is included, followed by an Appendix of study questions, Glossary and Index.

This useful book is jointly published by Pan American Navigation Service, No. Hollywood, Calif., and Weems System of Navigation, Annapolis, Md. 101 pages. Price $4.00.

**THE WEEMS LINE** includes many navigation aids and instruments which are standard equipment with U. S. Air Forces, major air lines and foreign governments. Many are navigation "musts" for pilot and student alike, especially the Weems Mark II Aircraft Plotter, the Dalton E-6B, or Mark VII Computer. A few of them are described below. Many others are available.

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# Airport Radar Ordered By CAA

## Bendix Radio gets CAA order for 14 airport surveillance radar sets, 14 precision approach sets

As a further step in the RTCA recommended Transition Program the CAA has ordered 14 sets of airport surveillance radar (ASR-3) and 14 precision approach radar's (PAR-2) from Bendix Radio Division. The complete installations will be made by Bendix and will consist of the necessary radar transmitter, modulators, antennae, etc. installed in buildings provided by the CAA.

The ASR will be located to give the best results over the entire range of the equipment, and high enough to clear all obstacles. It can pick up a two-place lightplane at a range of 30 miles, and multi-engine aircraft at 60 miles.

The PAR building will be located near the "bad weather" runway, but spaced several hundred feet from the runway to provide for adequate clearance for incoming or outgoing aircraft. Display consoled and control equipment for both ASR and PAR are located in the control tower.

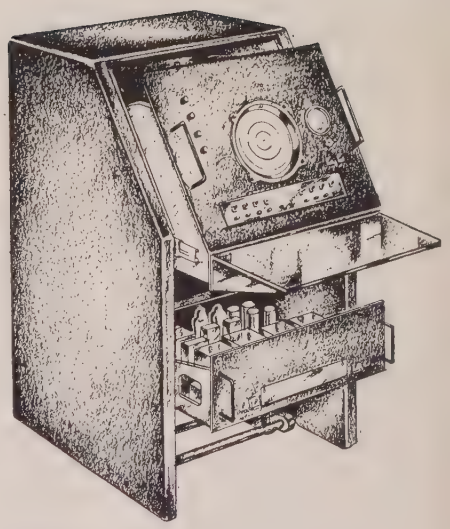
From an operational standpoint, ASR picks up aircraft up to 60 miles away and directs them to a point within 10 miles of the airport and in the proper position to make an instrument approach. The approach may then be completed by ILS if the aircraft is properly equipped. The approach will then be closely observed on PAR which can instantly detect any deviations from a proper approach path and warn the pilot over the VHF communications equipment. At the option of the pilot, or in aircraft not equipped with ILS, the CAA controller can "talk down" the pilot to a safe GCA landing.

In the wartime GCA a transparent overlay was made for the face of the search scope on which were marked the location of obstructions, markers and radio ranges. Separate overlays were required for each of 6-, 10-, 20- and 30-mile range radius. (The new ASR has five ranges). Video or electronic mapping in the Bendix ASR-3 projects a map of the area around the terminal onto the face of the scope in just the same way as the aircraft pips are presented.

Moving Target Indication (MTI) permits the elimination of fixed ground echoes which show up as permanent fluorescent lights on the ASR's 10-inch cathode ray oscilloscope. If these are not cut out, it is sometimes very difficult to spot the small moving pip which represents the aircraft being contacted.

Positive identification of each aircraft will be provided by means of an additional device for which Bendix has just received a contract. It is called a Very High Frequency Aircraft Direction Finder (VHF-ADF), and 44 of them are to be installed at airports now equipped, or to be equipped, with surveillance radar equipment.

This is a civilian-type development of the Bendix GDF-1 (Navy DBF-1) which has been in use for the past three or four years at NAS airfield control towers and with Navy's Bendix-type GCA units.



**CONSOLE** for Bendix ASR equipment

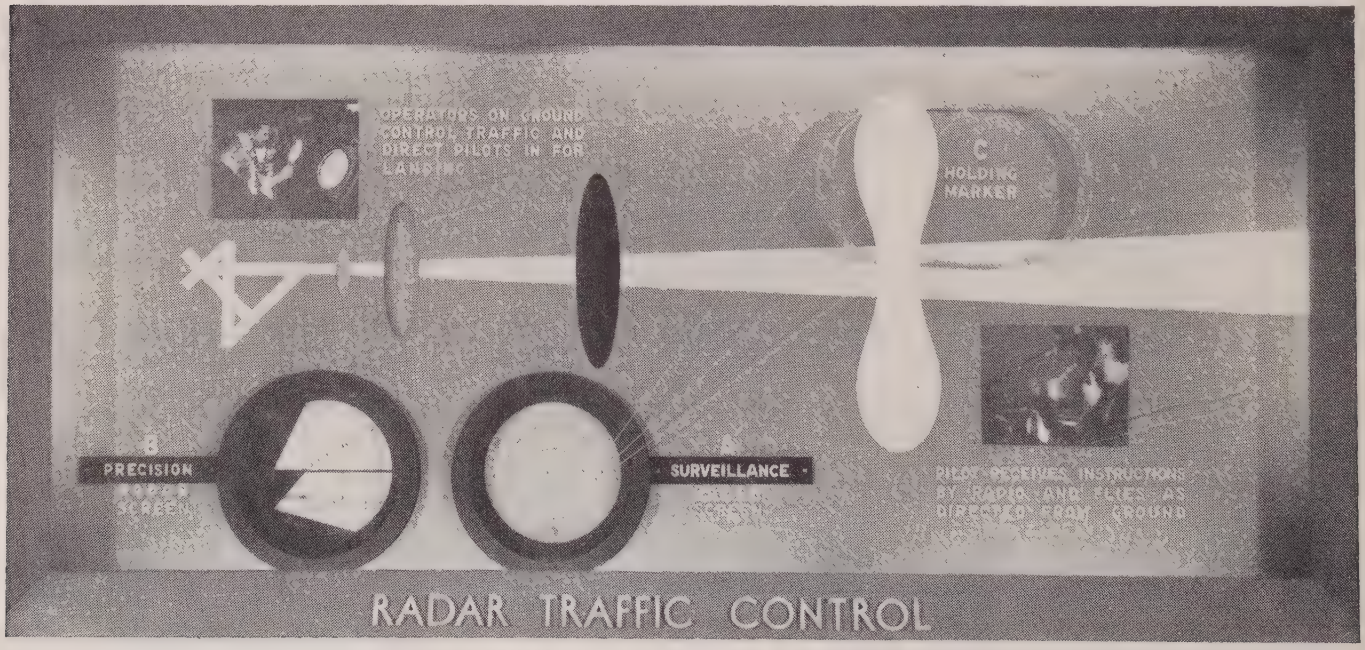
The system gives instantaneous visual bearings on signals transmitted on any frequency between 100 and 156 mc.

In operation, the ADF is linked with the ASR scope and actuated by the VHF radio impulses from the aircraft being contacted. A line of light is drawn on the screen from the aircraft pip to the center of the scope. This enables the controller to be certain which of the pips on his screen represents the plane with which he is in communication.

From the pilot's point of view, he not only has the assurance that he is positively identified by the controller, but is saved the necessity of executing those time-consuming turns he has been instructed to carry out to enable the controller to be sure of his "pip."

The VHF-ADF installation in the tower requires no additional equipment aboard the aircraft, since the VHF radio transmitter will automatically activate the direction finder every time he uses it.

**CAA EXHIBIT** shows the elements of U.S. postwar radar traffic control system. The PPI scope (A) picks up all aircraft within 30-mile radius; the double precision screen (B) gives side view of controlled aircraft on glide slope (upper), and its position in reference to runway



# Radio Freq. Bands

Ralph Brown of Sperry has sent in some notes on the standard FCC designations for radio frequency bands and on the letter codes developed during the war.

Very Low Frequency (VLF) 10-30 kc
Low Frequency (LF) 30-300 kc
Medium Frequency (MF) 300-3000 kc (3 mc)
High Frequency (HF) 3-30 mc
Very High Frequency (VHF) 30-300 mc
Ultra High Frequency (UHF) 300-3000 mc
Super High Frequency (SHF) 3000-30,000 mc

The following letter designations for the upper-frequency bands originated as security codes at the MIT Radiation Laboratory, Cambridge.

P-band 225-390 mc
L-band 390-1550 mc
S-band 1550-5200 mc
X-band 5200-11,000 mc
K-band 11,000-33,000 mc

C-band was a late addition, allocated today for navigational facilities, such as radar.

## High Intensity Lights In

By December, before the worst of the winter flying weather, some 15 of the busiest airports in the country will be equipped with approach lights of sufficient candlepower to really be of help to pilots. Five of the high-intensity approach light installations already commissioned are at: Baltimore, Philadelphia International, New York (La Guardia), Boston, Atlanta, Detroit (Willow Run), Houston, Dallas, Kansas City, St. Louis, Oakland, San Francisco, Burbank, Seattle and Portland.

# Automatic GCA Being Readied by Gilfillan

Early in 1947, at a small gathering of the press in the Hotel Astor, Maj. Gen. Harold R. McClelland, who did so much during the war to get GCA accepted by the Air Force and Navy, dropped a hint that the day may come when GCA could go one step further than being a reassuring "talk-down" system. Without going into technical details, which were then and still are classified, General "Mac" explained in general terms that an automatic attachment to a standard GCA installation could provide continuous *autopilot control* signals instead of the verbal instructions used in normal GCA approach control.

The Air Navigation Development Board, the outfit which is implementing the Common System of Air Navigation and Traffic Control hammered out by RTCA SC-31, has a Gilfillan Automatic GCA unit under test at the present time, and its recommendations will be watched with great interest.

What about the large proportion of aircraft which will not be equipped with the relatively expensive autopilot equipment? Amazingly enough, AGCA will be able to increase traffic capacity by simultaneously landing six aircraft with one communications frequency. The six aircraft can include planes with autopilots, planes with only ILS or omni-ILS crosspointer meters, or planes without either, equipped only with two-way radio.

AGCA is thus a multi-brained radar robot combining in a single simplified system all the features of the three existing instrument low approach and landing systems. (1) It automatically lands aircraft equipped with autopilot. (This is also being done with Sperry's Gyropilot with automatic approach.) (2) It provides a regular talk-down landing for aircraft without autopilot or with malfunctioning airborne radio equipment. (3) It also activates the ILS crosspointer meter for a crosscheck or for manual control (with or without the Zero Reader) if desired by the pliot.

# Unification Pays

A few months ago Maj. Gen. Harold M. McClelland, Director of Communications (Electronic), Joint Chiefs of Staff, was able to pull off a little stunt which should warm the heart of every groaning tax-payer.

The Armed Services (Army, Navy, Air Force, Marines) have been getting ready to step up to UHF communications for the past couple of years. Each service prepared specifications as to what it required in the way of a UHF receiver. If finally approved it would have meant piddling orders of 100 or so here, 150 or so there, etc.

General "Mac" got the technical boys together around a conference table, and asked each one to state just what it was basically that the UHF receiver they wanted had to do. Put that way, they soon reached substantial agreement, giving in a notch here and a notch there.

"Well, then, why won't the X-Radio Company's job do the trick for all of you?" As a matter of fact, it would, and orders were placed for several hundred of them.

The amount saved will take care of the general's pay and pension for the next 10 years!

# Radio Compass O.K'd

A CAA type certificate has been issued to the Dave Rumph Company of Fort Worth on a modified type military surplus R-5/ARN-7 (Bendix) radio compass. It is expected to find a ready sale to airlines, exporters and to operators of multi-engine aircraft.

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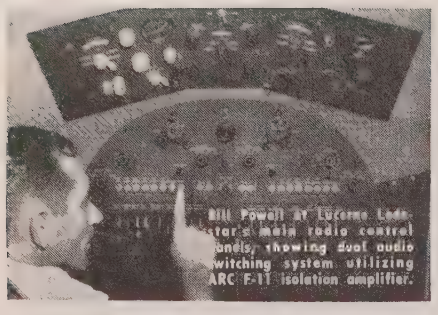
Bill Powell at Lucerne Lodestar's main radio control panels, showing dual audio switching system utilizing ARC F-11 isolation amplifier.

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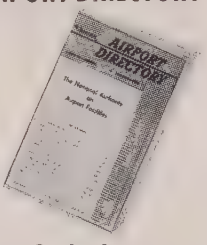


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# Radar Progress Measured in GB

## Interview with British expert discloses gains

At the joint meetings of the Institute of Navigation (ION), Radio Technical Commission for Aeronautics (RTCA) and Radio Technical Commission for Marine Services (RTCM), we had the privilege of meeting Sir Robert A. Watson-Watt, and of talking with him about some of the latest British developments in radar applications to air navigation and air traffic control.

While not the inventor of radar (there was no single inventor—it came about through a long series of discoveries), Sir Robert was prominent among a handful of physicists who applied the principle of radar to the urgent problem of early warning against enemy aircraft, and who through the development of the cavity magnetron made microwave radar practicable for large-scale use.

It was easy to see that Sir Robert regards ILS, in its present form at least, as in the obsolescent class. He regards radar, including GCA and ACR (Airfield Control Radar), and air-borne radar for storm cloud and obstacle detections, as fundamental aids in present and future developments.

He said that microwave radar, especially that working in the SHF band (3000 to 30,000 mc per second) has added great sensitivity and precision to earlier types, and that its radiation can be gathered in a very fine pencil beam that concentrates on the very aircraft whose landing is being controlled. He thinks it will be a very definite improvement when the radar data and the ground instruction can be displayed directly to the pilot's eye. Work to this end is going forward on both sides of the Atlantic.

The ACR equipment now in operation in England corresponds to the U.S. ASR sets by Gilfillan, GE and Bendix, with about the same capabilities. Sir Robert thinks the height-finding aspects of these sets are clumsy, but improvements are being worked on. Elimination of ground echoes (he called them "radar responses") by MTI technique is a valuable feature.

Asked about the airborne radar set made by E. K. Cole, Ltd. and reported as going into some of the British Overseas Airways Corporation's newest aircraft, Sir Robert said it had been pretty thoroughly wrung out in Hythe flying boats in the Far East, and in a couple of Vickers *Viking* transports in England. Production sets are being fitted to three new Handley Page *Hermes* transports, and some will go into the De Havilland *Comet* next year.

He described the set as a 3-centimeter X-band search radar designed by the TRE (Telecommunications Research Establishment) for searching out severe turbulence areas usually found with cumulonimbus clouds. It would also serve as an obstacle warning device, such as high ground, high buildings, and towers, and other aircraft. Finally, like the X-band set called "Mickey" by American bomber crews in England during the war, the Cole E38 "paints" the coastline and other prominent geographical features on its PPI scope, providing additional aid to navigation.

Asked about corresponding American equipment, Sir Robert said he didn't know of anything on this side in the lightweight class of the Cole unit, which weighs 155 pounds. I mentioned the Navy-developed Houston set, which weighs a little more, and the privately developed Allison unit, which weighs less—both are in the X-band.—NFS

**CONVAIR** T-29 navigation trainer is used as "Flying Classroom" by the USAF. Ten stations are located in T-29's man cabin *(below)*, with radar training section forward, behind curtain

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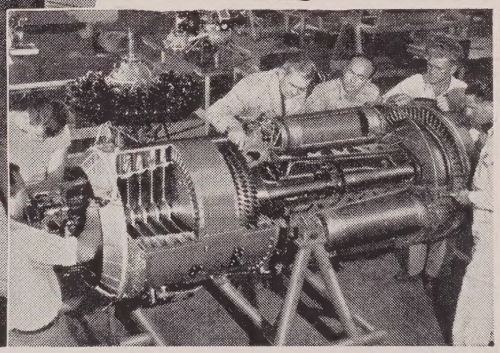

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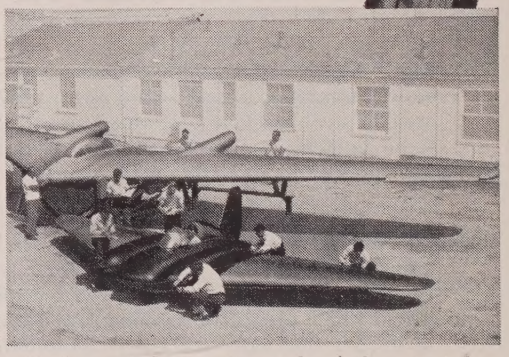

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